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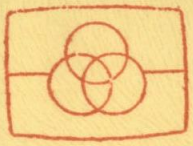
No. 8213

JVC Service Manual

COLOUR VIDEO MONITOR

MODEL TM-22E



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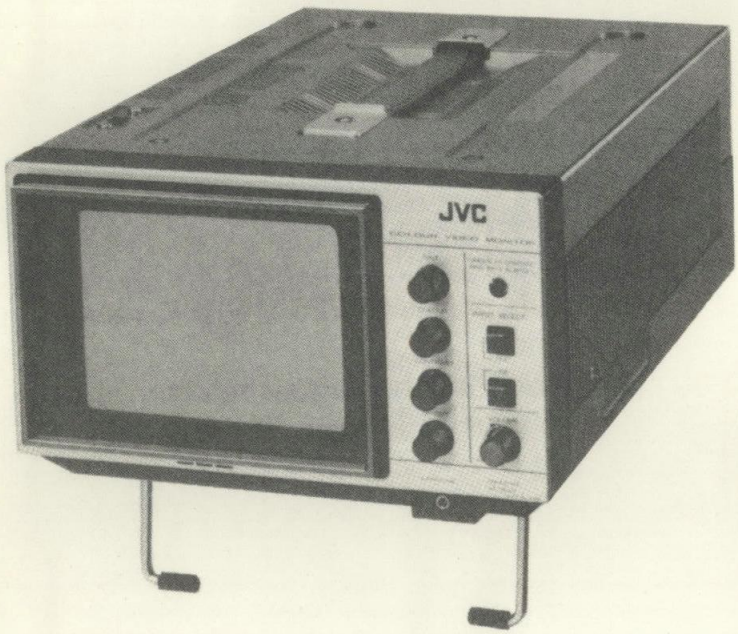

MODEL TM-22E

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SECTION 1
GENERAL DESCRIPTION

This manual provides service information for the JVC TM-22E Color Video Monitor. The manual describes the adjustments of mechanical and electrical operations for this model.

Service procedures given herein cover only field maintenance services.

Adjustments which require high-level instruments, jigs and techniques are excluded, since they should be performed at the factory.

Due to design modifications, the servicing procedures and data given in this manual are subject to possible change without prior notice.

For convenience, the text of the Instructions is reproduced in this section.

Numbering at the side center of the pages also corresponds to the Instructions.

Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

• Precautions during Servicing

1. Parts identified by the ⚠ symbol and shaded (▬) parts are critical for safety. Replace only with specified part numbers. (In products containing cathode ray tubes, the tubes themselves and certain other circuit parts are specified for conformance with recognized standards regarding X-ray emissions. These must also be replaced only with specified replacements.)
2. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation. These must also be replaced only with specified replacements. Examples: RF converters, tuner units, antenna selector switches, RF cables, noise blocking capacitors, noise blocking filters, etc.
3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads
4. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors
5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.), wrap ends of wires securely about the terminals before soldering.

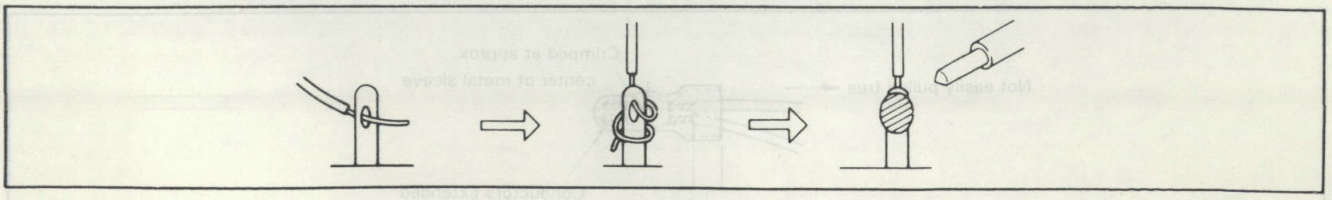

Fig. 1

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6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).
7. Check that replaced wires do not contact sharp edged or pointed parts.
8. When a power cord has been replaced, check that 10—15 kg of force in any direction will not loosen it.
9. Also check areas surrounding repaired locations.
10. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.
11. In products containing cathode ray tubes, the tubes are operated under conditions which do not result in hazardous X-radiation. At the same time, the tubes are manufactured from special glass that retards the passage of X-radiation. Moreover, the high voltage circuits are designed to prevent radiation from exceeding the limiting values.
    If the voltage is allowed to increase higher than the specifications, arcing and insulation damage may occur, while X-ray emission could approach the limiting value (0.5 millirems/hour). Therefore, when repairing the high voltage circuit, use only the safety specified parts and be sure to observe safe working procedures.
12. Crimp type wire connector

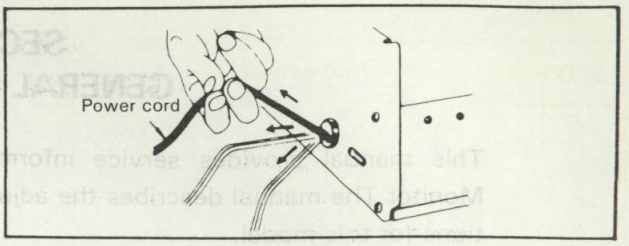

Fig. 2

In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

1. Connector part number : E03830-001
2. Required tool : Connector crimping tool of the proper type which will not damage insulated parts.
3. Replacement procedure
   1) Remove the old connector by cutting the wires at a point close to the connector.
      Important : Do not reuse a connector (discard it).
   2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.
   3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.
   4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.
   5) Check the four points noted in Fig. 7.

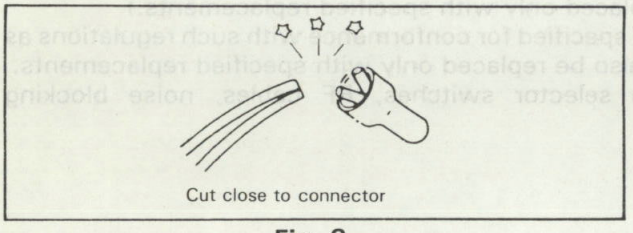

Fig. 3

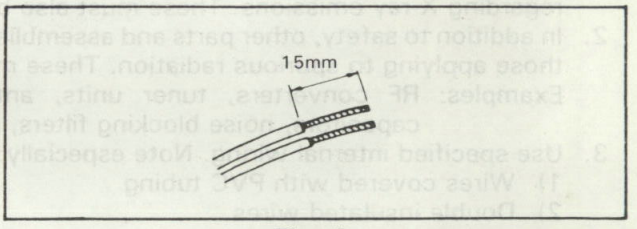

Fig. 4

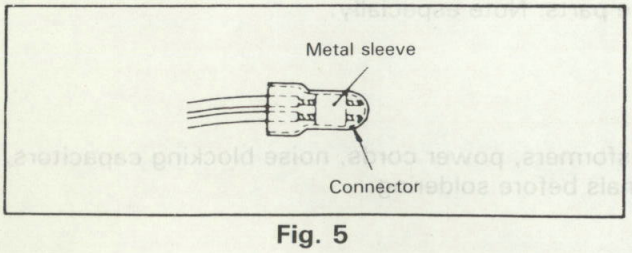

Fig. 5

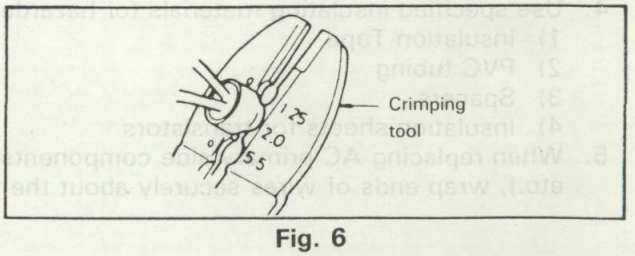

Fig. 6

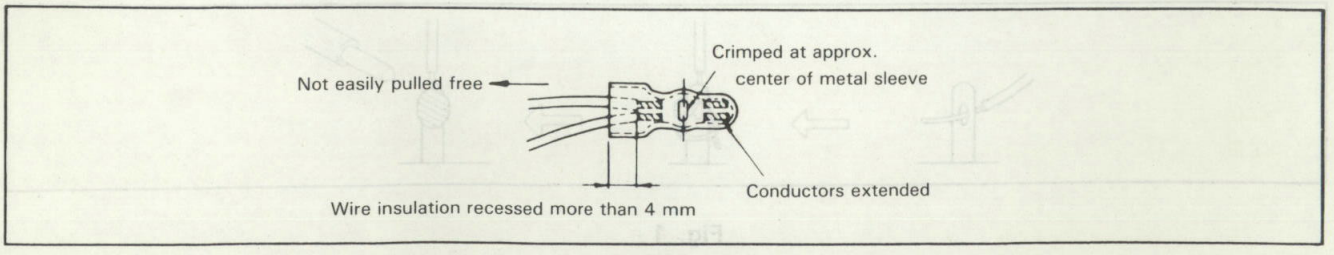
Not easily pulled free
Crimped at approx. center of metal sleeve
Conductors extended
Wire insulation recessed more than 4 mm

Fig. 7

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• Safety Check after Servicing

1 . Insulation resistance test

Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table below.

2 . Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table below.

3 . Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d),(d') between soldered terminals, and between terminals and surrounding metallic parts.
See table below.

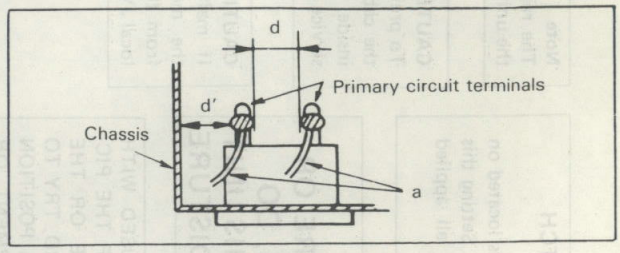

Fig. 8

Table 1: Ratings for selected areas

AC Line Voltage	Region	Insulation Resistance	Dielectric Strength	Clearance Distance(d),(d')
100 V	Japan	≧1 MΩ/500 V DC	1 kV 1 minute	≧3 mm
110 to 130 V	USA & Canada	— — —	900 V 1 minute	≧3.2 mm
* 110 to 130 V 200 to 240 V	Europe Australia	≧10 MΩ/500 V DC	4 kV 1 minute	≧6 mm (d) ≧8 mm (d') (a: Power cord)

* Class II model only.

Note. This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

4 . Leakage current test

Confirm specified or lower leakage current between B(earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

Measuring Method: (Power ON)
Insert load Z between B(earth ground, power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure and following table.

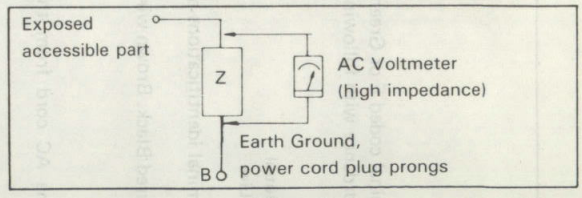

Fig. 9

Table 2: Leakage current ratings for selected areas

AC Line Voltage	Region	Load Z	Leakage Current (i)	Earth Ground (B) to:
100 V	Japan	1 kΩ	i ≦ 1 m A rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 μF, 1.5 kΩ	i ≦ 0.5 m A rms	Exposed accessible parts
110 to 130 V 200 to 240 V	Europe Australia	2 kΩ	i ≦ 0.7 m A peak i ≦ 2 m A dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 m A peak i ≦ 2 m A dc	Other terminals

Note. This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

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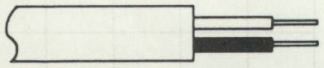
IMPORTANT (In the United Kingdom)
Mains Supply (AC 240 V∿, 50 Hz only)

IMPORTANT

Do not make any connection to the Larger Terminal coded E or Green. The wires in the mains lead are coloured in accordance with following code:



Blue: Neutral
Brown: Live

If these colours do not correspond with the terminal identifications of your plug, connect as follows:
Blue wire to terminal coded N (Neutral) or coloured Black. Brown wire to terminal coded L (Live) or coloured Red.
If in doubt – consult a competent electrician.

Note
We recommend that you should disconnect the AC cord from the outlet.

POWER SYSTEM

Connection to the mains supply
The operating voltage of this set is preset to 220 V∿ (EK-version: 240 V∿), at the factory.
Before connecting to mains, check that the voltage selector on the rear panel is set to the same voltage as your local mains supply.

Adapting to local power line
This set operates on either 110, 127, 220 or 240 V∿. The voltage selector can be reset as follows. Turn the voltage selector using a screwdriver until the proper voltage appears at the cutout.
Regarding this setting, consult your JVC dealer.

MAINS POWER SWITCH

The mains power switch is located on the rear connector panel. Setting this switch to OFF removes all applied from the unit.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

WHEN THIS SET IS USED WITH OTHER EQUIPMENT, IF THE PICTURE IS NOT STABLE OR THE BUZZ SOUND IS HEARD, TRY TO CHANGE THE MUTUAL POSITION OF RELEVANT EQUIPMENT OR TAKE ENOUGH DISTANCE BETWEEN THEM.

Note
The rating plate is on the bottom of the unit.

CAUTION
To prevent electric shock, do not open the cabinet. No user serviceable parts inside. Refer servicing to qualified service personnel.

CAUTION
If malfunctioning occurs, stop using the monitor immediately, unplug it from the AC outlet and consult your local JVC dealer.

Thank you for purchasing the JVC TM-22EG/EK Colour Video Monitor. This handy, portable unit can be used to monitor picture and sound when making either outdoor or indoor video recordings. Combine it with a JVC portable video cassette recorder and camera to make easy checks of camerawork when shooting your own colour video productions. To obtain the best performance and maximum use from your TM-22EG/EK, read this instruction booklet carefully and completely.

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FEATURES

- PAL/SECAM switchable colour system with a three-position switch for PAL, AUTO and SECAM.
- Compact, lightweight and handy to use.
- A 6-inch (13-cm viewing area) in-line black stripe picture tube capable of accurate, well-defined colour reproduction.
- Flexible AC/DC power supply – household AC or built-in exclusive rechargeable NB-P1 Ni-Cd battery pack – enabling both indoor and outdoor use.
- Built-in speaker enabling simultaneous audio and video monitoring.
- Dual circuits provided for audio and video signals.
- An LED indicator to warn of low battery power.
- Recharging function for the exclusive battery pack NB-P1.

PRECAUTIONS

- Prevent inflammables, water and metallic objects from entering the unit.
- Do not remodel or disassemble the unit. As the unit incorporates circuitry generating high voltage, physical danger and malfunctioning of the unit itself may result.
- Remove the AC power cord from the AC outlet when you are not using the unit for a long period.
- Do not damage the power cord. This could result in electric shock.
- **Precaution regarding charging the NB-P1 battery pack with the TM-22EG/EK**
  The TM-22EG/EK uses a simplified charging circuit. It may not fully charge the NB-P1 battery pack if the power line voltage is lower than the rated value. In such cases, it is advisable to use the AA-P22EG/EK/S AC Power Adapter or the TU-22EG/EK/S Tuner/Adapter.

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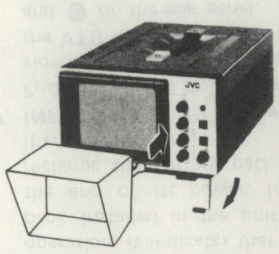
HANDLING

- Do not apply shocks or vibrations. Malfunctioning of the unit is likely to result.
- Do not place the unit near appliances generating strong electric or magnetic fields. Noisy or unstable pictures are likely to result.
- Do not use it in extremely hot places. Exposed to the direct sunlight for a long period of time or placed near a heater, the cabinet could become deformed, or the performance of the internal components may deteriorate. Special attention is required in summer. Inside a closed car the temperature can climb to as high as 80°C in the summer sun.
- Keep the monitor clean by wiping the cabinet and the CRT screen with a piece of soft cloth. Do not apply thinner or benzine. These chemicals can damage the surface finish and cause printed letters to be erased. Clean excessive soiling with a diluted neutral cleanser, then wipe away the cleanser with a dry cloth.
- Do not block the ventilation slots.



For outdoor usage
Apply a screen hood (provided) outdoors to eliminate reflections.
For installing the hood, insert the two small tabs on the rear of the hood into the slots on both sides of the screen. This easily fastens the hood securely, but not permanently. The hood can be easily fastened or removed by inserting its tabs or by pulling it forward. The monitor can be inclined by erecting the stands on the botton.

USING THE EXCLUSIVE OPTIONAL BATTERY PACK NB-P1

Lighting of the BATT ALARM indicator, while employing the optional built-in battery pack NB-P1, warns of insufficient battery power. Immediately recharge the battery pack or replace it with a fully charged one.

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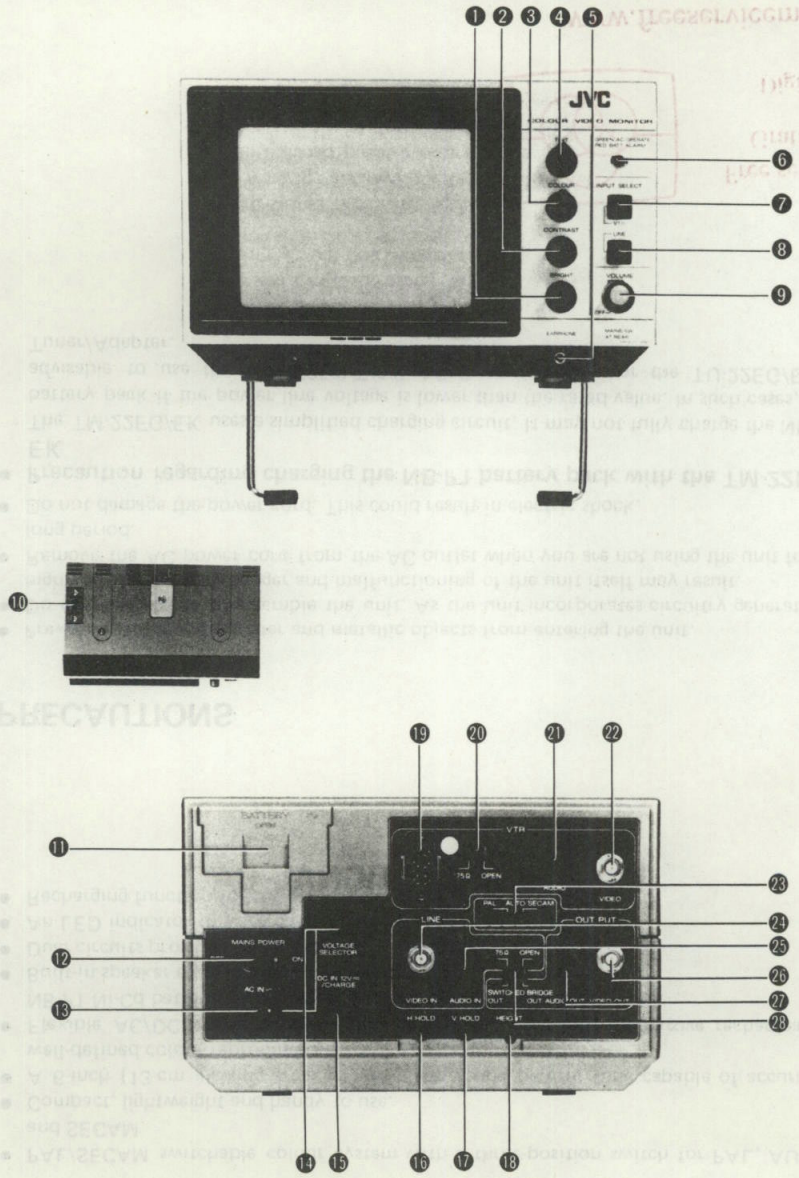
CONTROLS AND CONNECTORS



1. **BRIGHTness control knob**
   Turn counterclockwise to darken the picture and clockwise to illumine it.
2. **CONTRAST control knob**
   Turn counterclockwise to soften contrast and clockwise to sharpen.
3. **COLOUR control knob**
   Turn clockwise to deepen the colour tone and vice versa.
4. **TINT control knob**
   Turn counterclockwise to emphasize reds and clockwise to emphasize greens. Normally set this knob to its center click-stop position.
5. **EARPHONE jack**
   Plug in the provided earphone; audio monitoring is possible.
6. **BATT ALARM indicator**
   This lamp lights green when the AC power cord is plugged in and the MAINS POWER switch is set to ON. If this lamp lights red during battery operation, it indicates that the battery pack installed in the unit is nearing the end of its power. Immediately recharge the battery pack or replace it with a fresh one.
7. **INPUT SELECT "VTR" switch**
   Push this switch to monitor audio and video signals from a unit connected to the VTR input connectors ⑲ or ㉑ and ㉒ on the rear panel.
8. **INPUT SELECT "LINE" switch**
   Push this switch to monitor audio and video signals from a unit connected to the LINE input connectors ㉔ and ㉕ on the rear panel.
9. **OFF/VOLUME control knob**
   Turn this switch clockwise till it clicks for powering the TM-22EG/EK. By turning the knob further you can adjust the volume of the audio. Turn the knob fully counterclockwise until it clicks to turn the power off. Make it a rule to put this switch in the OFF position after operating the unit and before recharging the installed battery pack.
10. **CHARGE/MONITOR switch**
    Set this switch to MONITOR for monitoring the picture. Set to CHARGE for charging the installed exclusive NB-P1 Ni-Cd battery pack.
11. **Battery compartment**
    Install the exclusive NB-P1 battery pack here.
12. **MAINS POWER switch**
    Switching ON applies mains power to the set. To switch off the set completely, set the power switch to OFF.
13. **AC IN ∿ socket**
    Using the provided AC power cord, connect the AC IN terminal of the monitor to an AC outlet. When this terminal is being used, the installed battery cannot be employed. Make it a rule to unplug the power cord from this terminal when employing the exclusive battery pack.
14. **VOLTAGE SELECTOR**
    To reset the operating voltage, see "POWER SYSTEM" page 1.
15. **DC IN 12 V⎓/CHARGE DIN (7-pin) socket**
    Recharging the installed battery pack is also possible by connecting the DC output plug of the AA-P22EG/EK/S AC Power Adapter or the TU-22EG/EK/S tuner adapter to this terminal.
16. **H. HOLD control**
    Turn counterclockwise when the picture is slanting to the right and clockwise when slating to the left.
17. **V. HOLD control**
    Turn in either direction to stop vertical rolling of the picture.
18. **HEIGHT control**
    Turn in either direction to adjust the picture if it's too narrow or elongated, using a screwdriver.
19. **VTR (8-pin) connector**
    Connect the monitor to the video/audio monitor terminal of a VTR or other video sources.

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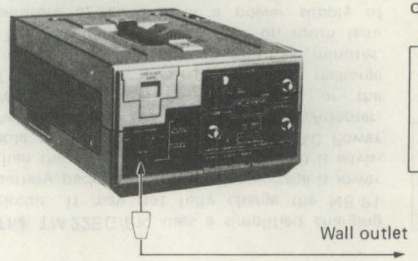
20. **VTR 75 Ω termination switch**
Set this switch to 75 Ω to terminate the input signals of the VTR connected to the 8-pin connector ⑲ or to the VTR AUDIO and VIDEO input/output connectors ㉑ and ㉒. Set it to OPEN to make the input signals of the VTR connected to the 8-pin connector ⑲ available at the VTR AUDIO and VIDEO input/output connectors ㉑ and ㉒.
21. **VTR AUDIO input/output DIN (5-pin) socket**
22. **VTR VIDEO input/output BNC connector**
Connect the audio and video outputs from a video tape recorder or other video sources to these two connectors. Or use these connectors to produce signals bridged from the VTR connected to the 8-pin connector ⑲.
23. **PAL/AUTO/SECAM colour system select switch**
PAL: Set to this position when the input signal conforms to PAL.
AUTO: The circuit is automatically switched either for PAL or SECAM depending on the input signal. This position is sufficient for most purposes.
SECAM: Set to this position when the input signal conforms to SECAM.
24. **VIDEO LINE IN BNC connector**
25. **AUDIO LINE IN DIN (5-pin) socket**
Connect the audio and video outputs from a video tape recorder or other video sources to be monitored to these two connectors.
26. **OUTPUT VIDEO BNC connector**
27. **OUTPUT AUDIO DIN (5-pin) socket**
Use these connectors to produce audio and video signals being monitored with the front panel input select switches or bridged from the LINE connectors ㉔ and ㉕.
28. **75 Ω termination/OUTPUT select switch**
Set this switch to 75 Ω to terminate the input signals connected to the LINE VIDEO IN and AUDIO IN connectors ㉔ and ㉕. Or set this switch to OPEN BRIDGE OUT when you wish to make available at the OUTPUT VIDEO and AUDIO connectors ㉖ and ㉗ signals connected to the LINE connectors ㉔ and ㉕.

To monitor signals applied to the 8-pin VTR connector ⑲ or the audio and video input/output connectors ㉑ and ㉒, push the front panel INPUT SELECT "VTR" switch.

To monitor signals applied to the video and audio LINE connectors ㉔ and ㉕, push the front panel INPUT SELECT "LINE" switch.

POWER SUPPLY

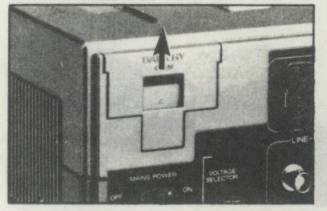
Using an AC outlet



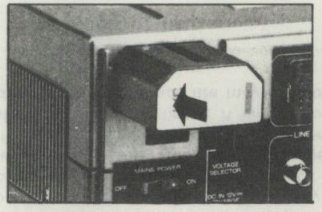
Plug the provided power cord into an AC outlet.

The monitor cannot be powered from the battery pack if the power cord is plugged into the monitor. Make sure the power cord is disconnected from the monitor before the battery pack is used.

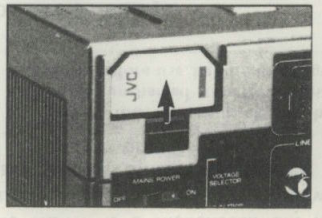
Installing the exclusive NB-P1 battery pack:



1. Lift up the battery compartment cover by putting your finger into the slot of the battery compartment cover.



2. Insert a battery pack into the compartment. When it is fully inserted, it locks in automatically and electrical connection is made.



3. To remove the battery pack, pull up the battery eject knob which is located under the battery pack insertion slot.

If the BATT ALARM indicator should light red after installing the battery pack, recharge the battery pack or replace it with a fully charged one.

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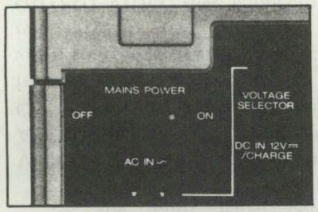
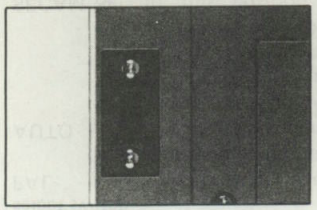
RECHARGING THE EXCLUSIVE Ni-Cd BATTERY PACK NB-P1

The TM-22EG/EK can recharge the installed NB-P1 battery pack in 8 – 12 hours.

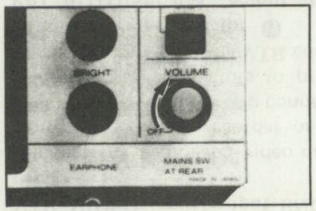
1. Connect the power cord to the AC outlet.



2. Set the MAINS POWER switch at the rear of the unit to ON.



3. Set the CHARGE/MONITOR switch on the top of the unit CHARGE.



4. Turn the OFF/VOLUME control knob clockwise till it clicks to apply power. This starts recharging.
   - Do not recharge the NB-P1 battery pack more than 15 hours to obtain its maximum service life.
   - After finishing recharging, turn the OFF/VOLUME control knob counterclockwise until it clicks to turn the power off. Then set the CHARGE/MONITOR switch to MONITOR.
   - Both AA-P22EG/EK/S and TU-22EG/EK/S can also recharge the NB-P1 battery pack. For more information, read the instruction booklets for these models.

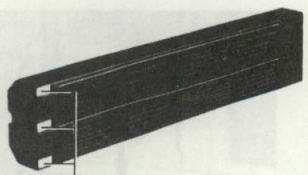
Note:
- About 8 hours are required to fully charge the battery pack. However, it is recommendable to continue charging a little longer (about 10 – 12 hours.)

Cautions regarding the battery pack and recharging

The NB-P1 is a nickel-cadmium (Ni-Cd) battery. Give attention to the following to make the most of its characteristics.

For safety, this battery pack has been kept in the uncharged state for shipment. Therefore, before use, be sure to charge it.

- **Do not over-discharge.**
  During operation with this battery pack, if the battery power warning indicator of your recorder lights, turn the power switch off or replace the battery pack with a charged one. If you continue to discharge the battery pack after the indicator lights, it will be over-discharged and its service life may be shortened.
- **Avoid repeated charging.**
  Charging the battery pack repeatedly without using it may cause over-charging and shorten its service life.
- **Recharge using only a specified charger at 10°C to 35°C.**
  Especially avoid recharging in a place under 10°C, as it may cause over-charging.
- **After use, store in a discharged condition.**
- **Do not store in places of high temperatures.**
  Choose a dry place having temperatures between -10°C and 30°C for optimum storage.
- **The battery pack becomes warm immediately after being charged. This is not due to any defect.**



Caution
The terminals are exposed on the bottom of the battery pack. DO NOT short-circuit these terminals.
- If they are shorted, a great amount of current flows. This is not only very dangerous, but also makes the battery pack unusable.
- When transporting or storing the battery pack, exercise special care so that no metallic object touches the terminals.
- Always keep the terminals clean. If they become dirty, wipe with a piece of soft cloth.

- The TM-22EG/EK uses a simplified charging circuit. It may not fully charge the NB-P1 battery pack if the power line voltage is lower than the rated value. In such cases, it is advisable to use the AA-P22EG/ EK/S AC Power Adapter or the TU-22EG/ EK/S Tuner/Adapter.
- When using the AA-P22EG/EK/S or the TU-22EG/EK/S, it's possible to recharge the NB-P1 battery pack in about 90 minutes. (The recharging time is based on room temperature of 20°C with a power supply of 220 V∿ [EK version: 240 V∿]. The lower the temperature, the longer the recharging time.)

Temperature ranges:	
For recharging:	10°C to 35°C
For operating:	-10°C to 40°C
For storing:	-10°C to 30°C

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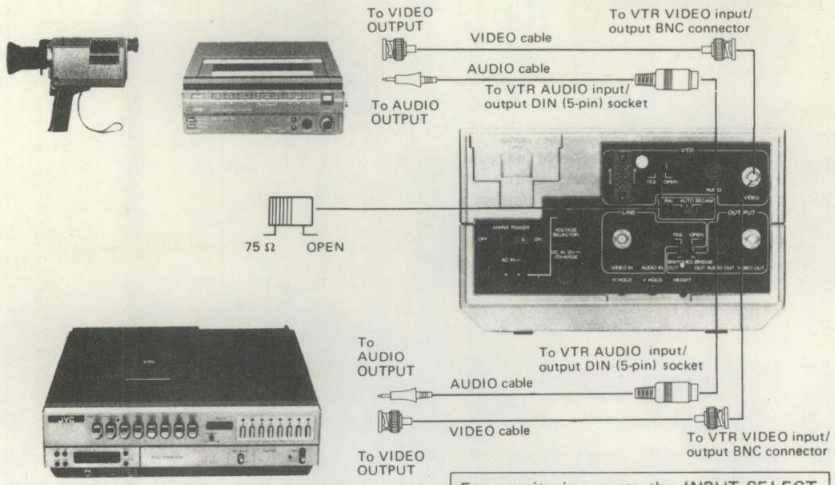
CONNECTIONS

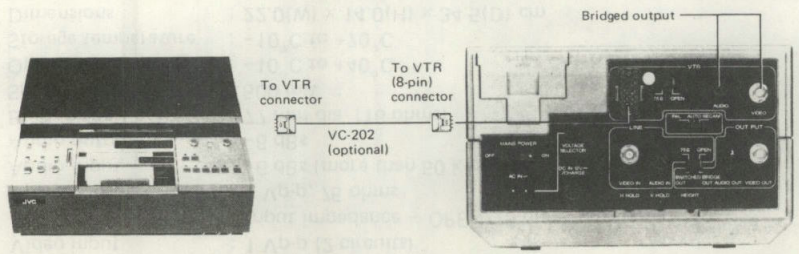
Using in combination with a JVC VHS recorder

The TM-22EG/EK is most convenient when you use it in combination with a portable recorder and camera to monitor camerawork when operating outdoors.



For monitoring, press the INPUT SELECT "VTR" switch on the front panel.

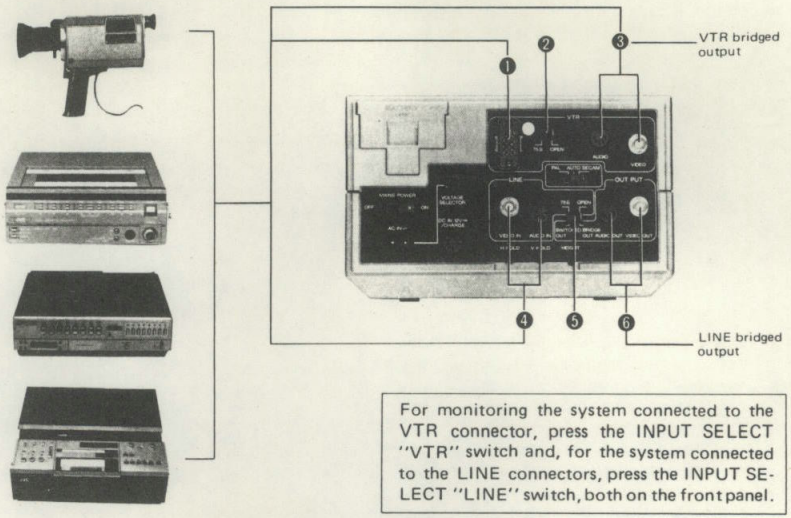
Using in combination with a video recorder having an 8-pin VTR connector



Caution
No video/audio output is available from the 8-pin VTR connector. Recording directly from this connector is not possible.

- To obtain bridged outputs from a source applied to the connectors to the right, shift this switch to OPEN. Leave this switch at 75 Ω in other cases.
- For monitoring, press the INPUT SELECT "VTR" switch on the front panel.

Using both the VTR and LINE circuits



For monitoring the system connected to the VTR connector, press the INPUT SELECT "VTR" switch and, for the system connected to the LINE connectors, press the INPUT SELECT "LINE" switch, both on the front panel.

Operation chart (the numbers correspond to those shown in the above illustration)

Input connectors	Termination switch	Input select switch on the front panel	Bridged output	Switched output
❶ Apply input signals	❷ 75 Ω	VTR	–	–
❶ Apply input signals	❷ OPEN	VTR	❸ Audio/video bridged outputs available	–
❸ Apply input signals	❷ 75 Ω	VTR	–	–
❹ Apply input signals	❺ BRIDGE OUT	LINE	❻ Bridged outputs available	–
Apply input signals to both ❹ and ❶ or ❸	❷ ❺ 75 Ω SWITCHED OUT	VTR or LINE	–	❻ Outputs selected by the input select switch available

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SPECIFICATIONS

Type	: Colour video monitor
Colour system	: PAL/SECAM switchable
Picture tube	: 6'' (13-cm viewing area)
Power requirement	: 110/127/220/240 V AC∿, 50 Hz 12 V DC ⎓ (exclusive battery pack NB-P1)
Power consumption	: 26 W (AC∿)
Video input	: 1 Vp-p (2 circuits) Input impedance — OPEN/75 ohms selectable
Video output	: 1 Vp-p, 75 ohms
Audio input	: -6 dBs (more than 50 k-ohms)
Audio output	: -6 dBs
Built-in speaker	: 77 mm dia. (16 ohms)
Speaker output	: 500 mW
Operating temperature	: -10°C to +40°C
Storage temperature	: -10°C to +70°C
Dimensions	: 22.0(W) x 14.0(H) x 34.5(D) cm
Weight	: 4.1 kg
Accessories	: Hood, Power cord, Earphone Audio cable, Video cable

Design and specifications subject to change without notice.

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SECTION 2
DISASSEMBLY

2.1 TOP COVER

Take out 6 screws ① shown in Fig. 2-1. Gently press the top of the front panel in the forward direction and open the top cover. Disconnect connector Ⓐ (see Fig. 2-2) of the battery case from the power supply board, then remove the top cover.

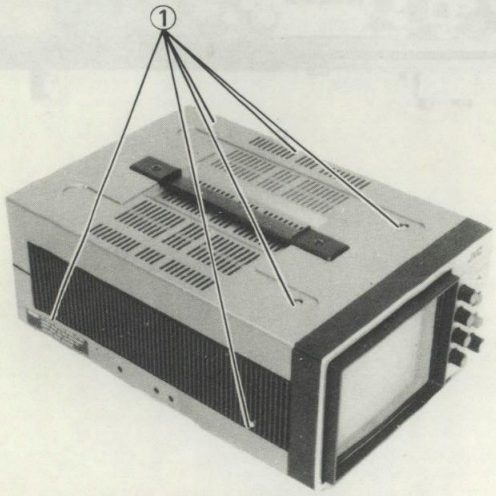

Fig. 2-1

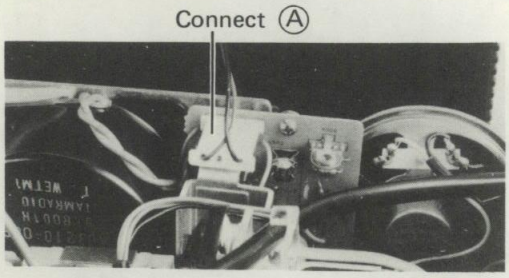

Fig. 2-2

2.2 POWER CORD ASSEMBLY

Take out 2 screws ① shown in Fig. 2-3. Raise the power supply board assembly upward to remove.

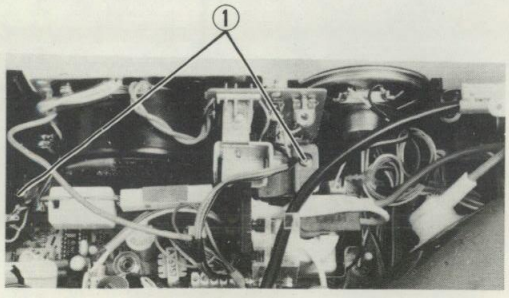

Fig. 2-3

2.3 FRONT PANEL

Remove the top cover. Disconnect the CRT socket, CRT ground, anode cap and deflection yoke. Take out 2 screws ① shown in Fig. 2-4 and remove the front panel.

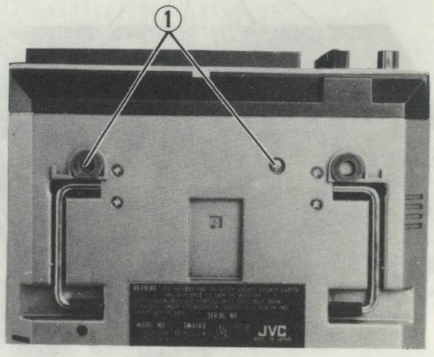

Fig. 2-4

2.4 CRT

Remove the front panel. Take out 4 screws ① shown in Fig. 2-5 and remove the CRT.

2.5 CONTROL BOARD ASSEMBLY

After the front panel has been removed, pull off 5 control knobs. Take out 2 screws ② shown in Fig. 2-5. The control board assembly can then be removed.

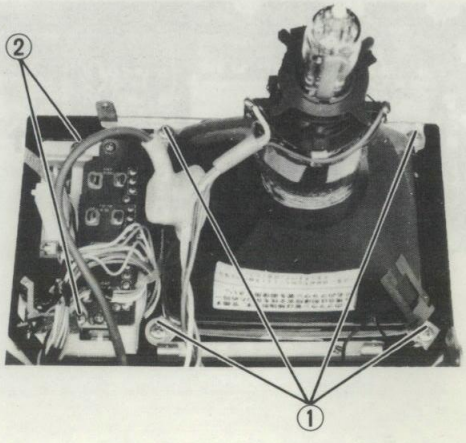

Fig. 2-5

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2.6 MAIN BOARD

Remove the power supply assembly and front panel (see steps 2 and 3). Take out 5 screws ① shown in Fig. 2-6 and remove the main board.

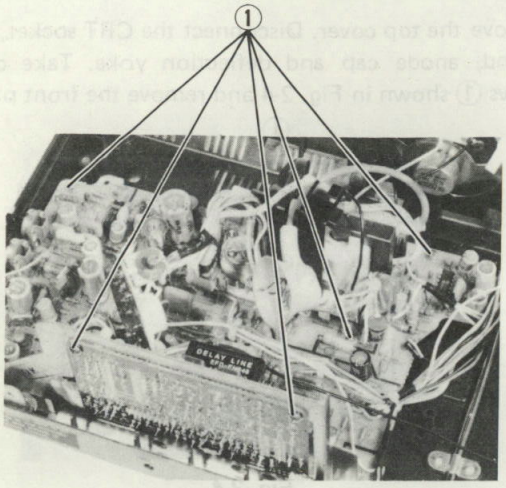

Fig. 2-6

2.7 VIDEO/AUDIO BOARD-1

Remove the top cover and the jack board assembly. Unsolder the points shown by arrows in Fig. 2-7 and remove the board.

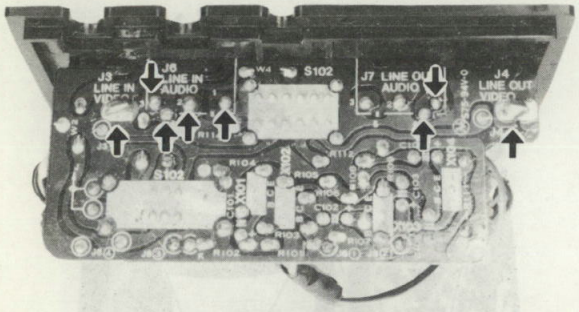

Fig. 2-7

2.8 VIDEO/AUDIO BOARD-2

In the same manner as step 7, unsolder the points shown by the arrows in Fig. 2-8 and remove the board.

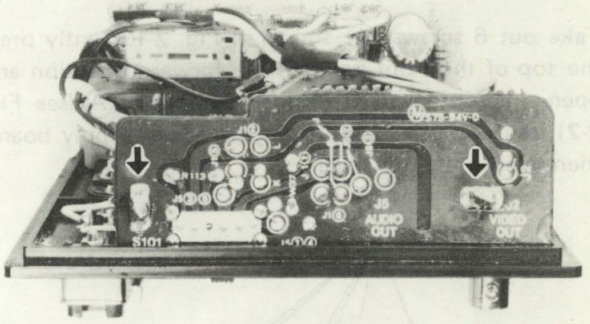

Fig. 2-8

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SECTION 3
ALIGNMENT PROCEDURE

3.1 B1 VOLTAGE (10.5 V)

Measure the voltage between TP-91 of the power supply and ground. Adjust R506 (B1) to obtain 10.5 V. See Fig. 3-1.

1) Be sure to perform this adjustment before proceeding to other repairs and adjustments.
2) Use a good quality voltmeter (internal resistance at least 20 kΩ/V) to perform measurement.

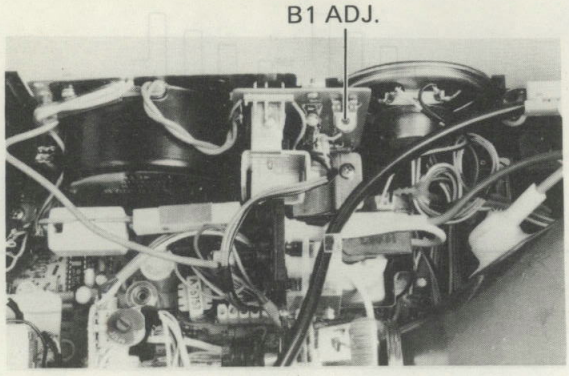

Fig. 3-1

3.2 PAL COLOR CIRCUIT ADJUSTMENT

1. Test Equipment and Tools
   Dual trace oscilloscope (with X-Y input facilities)
   PAL color bar generator
   Bias power source
   Insulated adjusting rod
   Short jumper wire

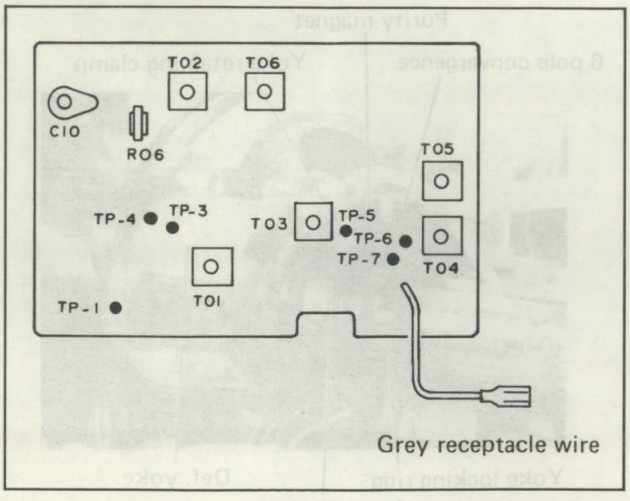

Fig. 3-2

2. Adjustment Steps
   1) Supply a PAL color bar signal.
   2) Connect the X probe of the oscilloscope to U4 of TRC-5210A and the Y probe to U5. Observe the Lissajous pattern as shown in Fig. 3-3.

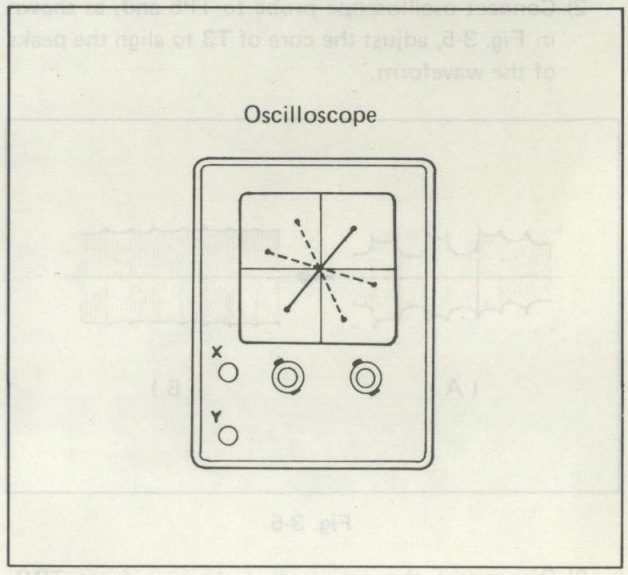

Fig. 3-3

   3) Connect jumper wire between TP3 and TP4.
   4) Supply approx. 3.7 V DC bias to TP1.
   5) Turn R06 (DL AMP) and, as shown in Fig. 3-4, adjust to where waveform A changes to waveform B.

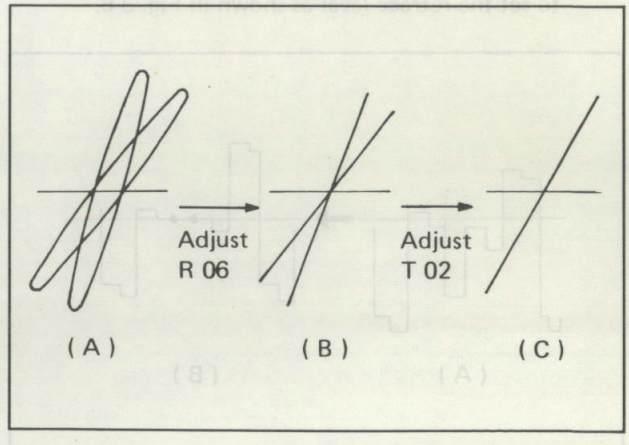

Fig. 3-4

   6) Turn the core of T02 (DL P. TRANS) to change waveform B to waveform C.
   7) Adjust C10 trimmer capacitor to set color sync.

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3.3 SECAM COLOR CIRCUIT ADJUSTMENT

1. Test Equipment and Tools
   Oscilloscope
   SECAM color bar generator
   VTVM
   Insulated adjusting rod
2. Adjustment Steps
   1) Supply a SECAM color bar signal.
   2) Connect oscilloscope probe to TP5 and, as shown in Fig. 3-5, adjust the core of T3 to align the peaks of the waveform.

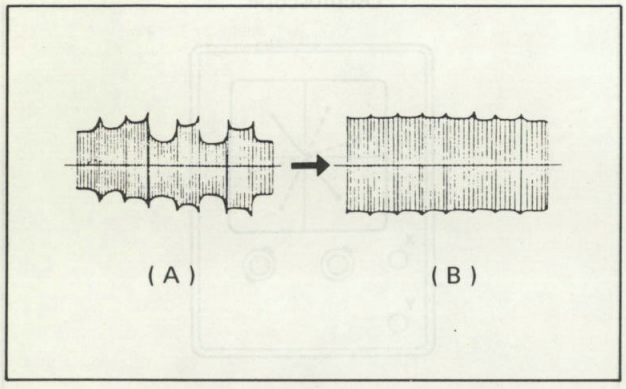

Fig. 3-5

   3) Disconnect the grey receptacle wire from TRC-5210A.
   4) Connect VTVM between TP6 (+) and TP7 (—). Adjust the core of T04 for maximum (approx. 1 Vp-p) at both ends. At this time, confirm normal color bar phase.
   5) Observe the waveform at the coupling point between L1001 and C1005. Adjust the core of T06 to set the retrace level as shown in Fig. 3-6.

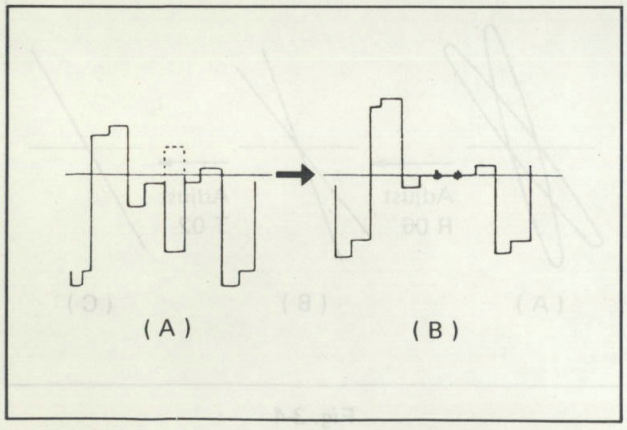

Fig. 3-6

   6) Observe the waveform at the coupling point between L1002 and C1005. Adjust the core of T05 to set the retrace level as shown in Fig. 3-7.

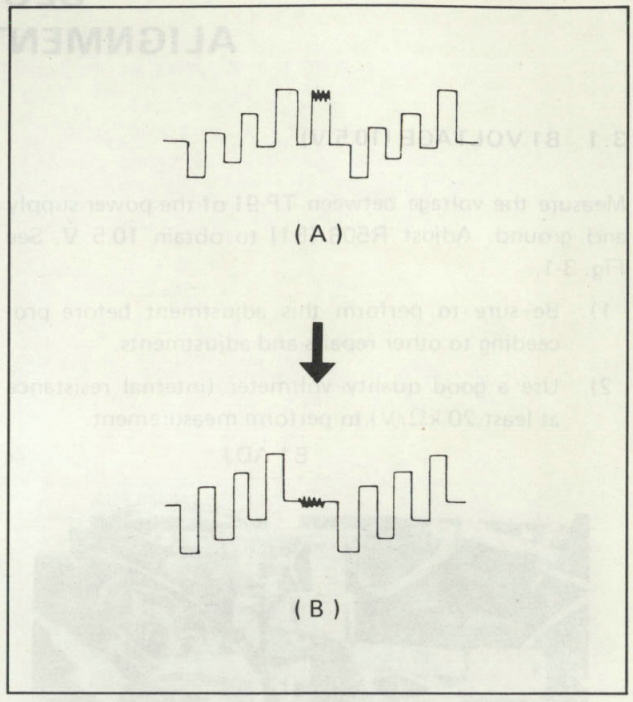

Fig. 3-7

3.4 PURITY

1) Display a monochrome pattern.
2) As viewed from the back (see Fig. 3-8), turn the magnet lock counter-clockwise to loosen it.

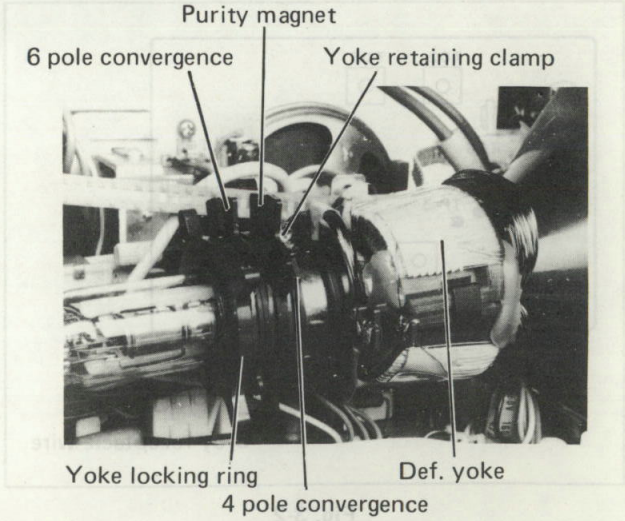

Fig. 3-8

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3) Turn the green cutoff VR fully clockwise and the red and blue cutoff VRs fully counter-clockwise. Adjust the screen VR so that the vertical green band becomes easy to see.

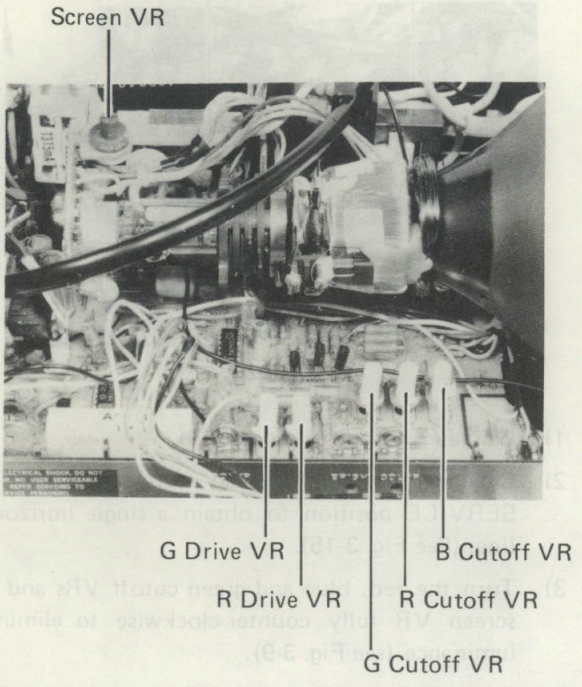

Fig. 3-9

4) Loosen the deflection yoke securing screw and slide the yoke fully rearward to obtain color shading in the green band.

5) Overlap the long and short purity magnet tabs and position them horizontally (see Fig. 3-10).

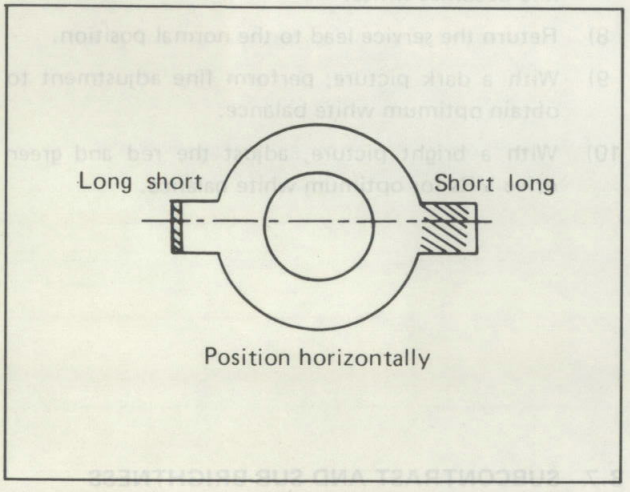

Fig. 3-10

6) Open and close the two purity magnets (scissor fashion) and adjust so that the green band is positioned at the center of the picture.

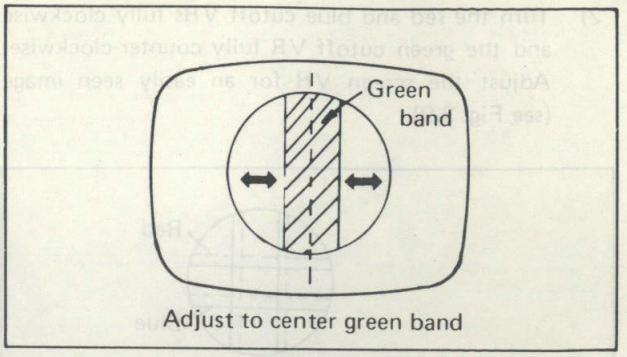

Fig. 3-11

7) Change the service lead connection from the normal to the SERVICE position to obtain a single horizontal line. Confirm that the vertical center position does not deviate. If deviation occurs, while keeping the same relative opening between the magnets, turn both magnets and adjust to center the line as closely as possible (Fig. 3-12).

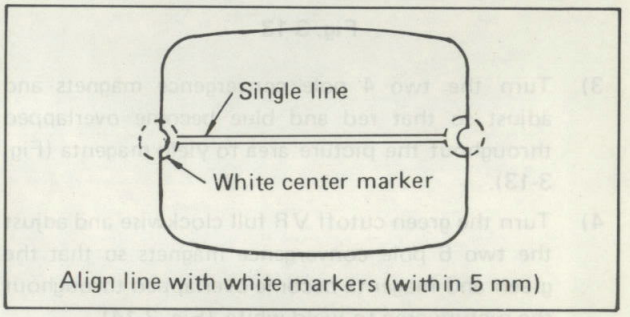

Fig. 3-12

8) Repeat above steps 6 and 7.

9) Return the service lead to its normal position. Slide the deflection yoke forward and adjust its position so that the green color completely fills the picture area.

10) Confirm that both red and blue single color resters can also be obtained.

11) Without moving the deflection yoke, tighten its securing screw. Tighten the magnet lock lightly so that there is no movement when the 6 pole magnets are lightly touched.

3.5 CONVERGENCE

1) Employ a crosshatch pattern and adjust the brightness so that the image is clear, but slightly darkened.

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2) Turn the red and blue cutoff VRs fully clockwise and the green cutoff VR fully counter-clockwise. Adjust the screen VR for an easily seen image (see Fig. 3-9).

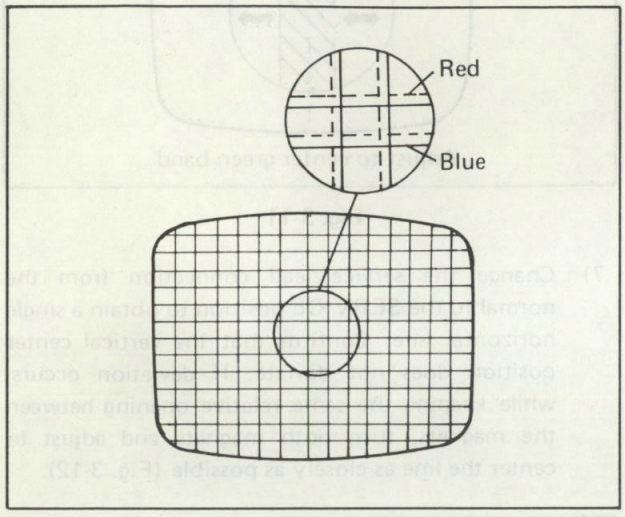

Fig. 3-13

3) Turn the two 4 pole convergence magnets and adjust so that red and blue become overlapped throughout the picture area to yield magenta (Fig. 3-13).

4) Turn the green cutoff VR full clockwise and adjust the two 6 pole convergence magnets so that the green and magenta become overlapped throughout the picture area to yield white (Fig. 3-14).

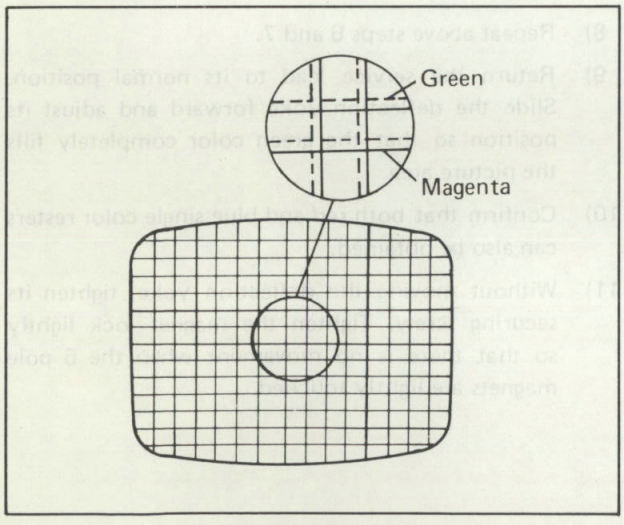

Fig. 3-14

*After completing purity and convergence adjustments;

1) Turn magnet lock clockwise (as viewed from rear of set) and tighten securely.

2) Tighten the deflection yoke screw securely.

3.6 WHITE BALANCE

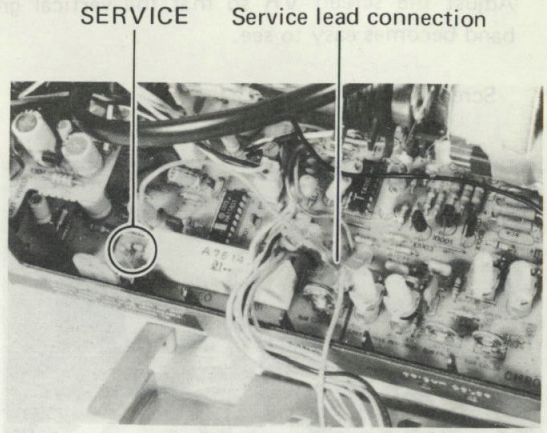

Fig. 3-15

1) Display a monochrome pattern.

2) Change the service lead connection to the SERVICE position to obtain a single horizontal line. (See Fig. 3-15).

3) Turn the red, blue and green cutoff VRs and the screen VR fully counter-clockwise to eliminate luminance (see Fig. 3-9).

4) Gradually turn the screen VR clockwise to where single line of one of the colors appears.

5) Turn the cutoff VR of this color clockwise about 10 degrees.

6) Again turn the screen VR so that this color appears only faintly.

7) Adjust the other cutoff VRs so that the horizontal line becomes white.

8) Return the service lead to the normal position.

9) With a dark picture, perform fine adjustment to obtain optimum white balance.

10) With a bright picture, adjust the red and green drive VRs for optimum white balance.

3.7 SUBCONTRAST AND SUB-BRIGHTNESS

Display a picture and set the front panel contrast and brightness controls to the center click positions. Adjust R116 (subcontrast) and R133 (sub-brightness) of the main board for optimum display.

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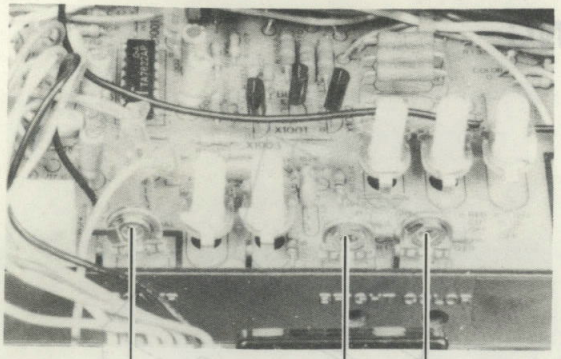

Fig. 3-16

3.8 SUBCOLOR

Display a fleshtone pattern and set the front panel tint and color controls to the center click positions. Turn R1030 (subcolor) of the main board and adjust for most natural fleshtone display.

3.9 V. HEIGHT AND H. WIDTH

Display a pattern which allows easy confirmation of symmetry (such as a circle or crosshatch). Adjust R311 (V. height) and the core of L402 (H. width) for optimum size relationships.

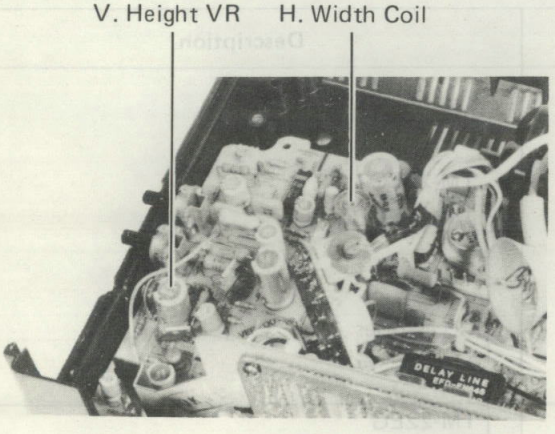

Fig. 3-17

3.10 V. CENTER

Turn R324 (V. center) to adjust picture center.

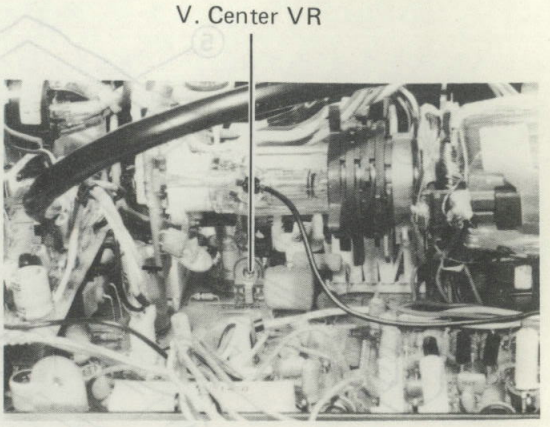

Fig. 3-18

3.11 FOCUS

Turn R420 (focus) and adjust for the range of optimum overall picture focus. Within this range, set the VR to the most clockwise position. Also confirm that focus is obtained with a dark picture.

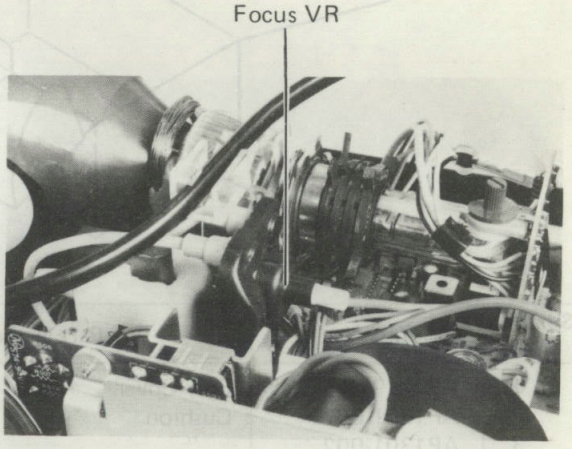

Fig. 3-19

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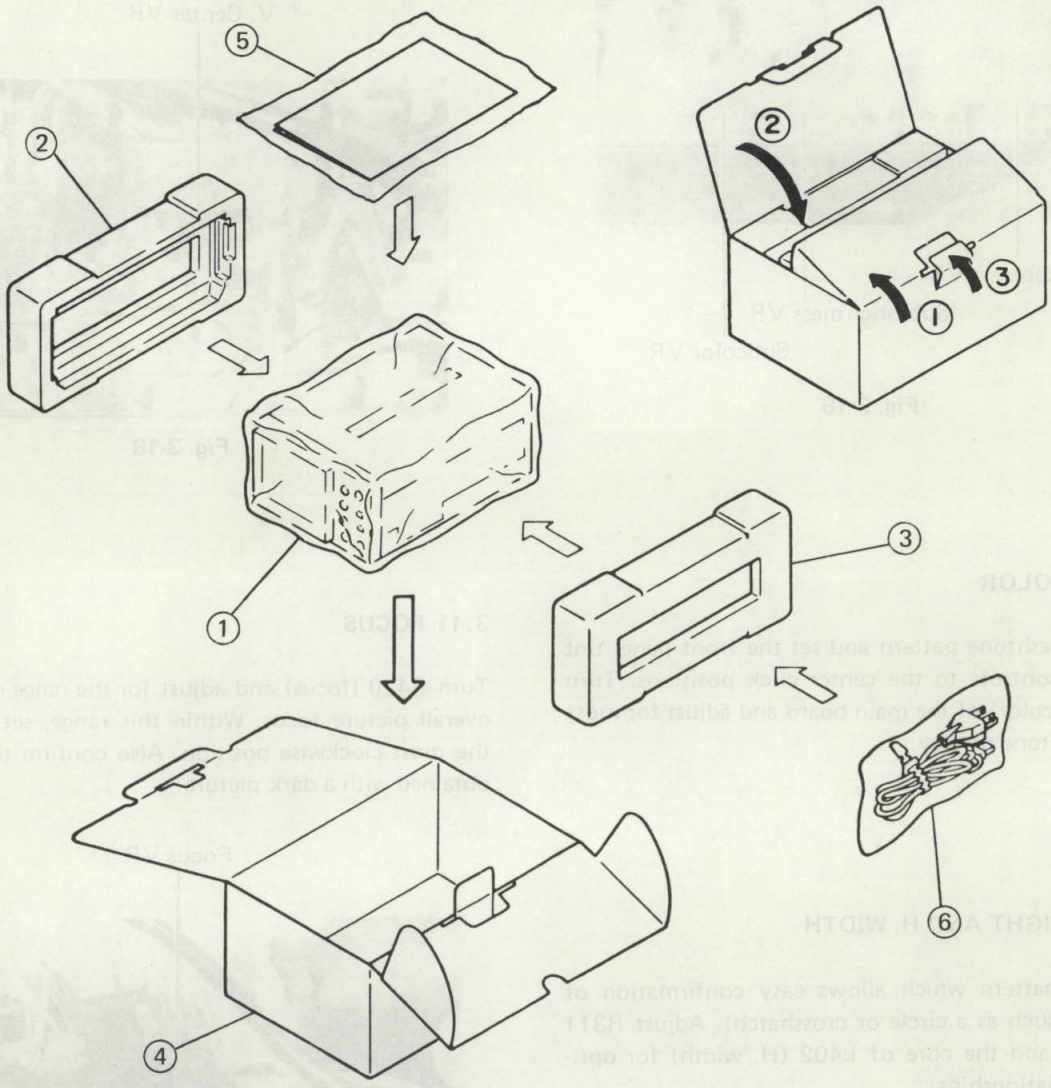
SECTION 4
REPACKING



Symbol No.	Part No.	Part Name	Description
1	AP3279-018	Poly Cover	
2	AP1301-001	Cushion	
3	AP1301-002	"	
4	AP3412-009	Packing Case	TM-22EG
	AP3412-010	"	TM-22EK
5	PU30425-417	Instruction Book	
	PU47353	Video Cable	
	PU49200	Audio Cable	
	CM20125-00A	Hood	Accessories
	QME1308-009	Earphone	
	QPGA015-02005	Poly Bag	
⚠ 6	QMP3950-183	Power Cord	TM-22EG
⚠	PU46128	"	TM-22EK
	QPGA015-02005	Poly Bag	

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SECTION 5
EXPLODED VIEWS AND PARTS LIST

5.1 SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

5.2 GENERAL RULER FOR NUMBERING METHOD OF SCREW/WASHER/E-RING

Type of screw — Diameter — Length in mm — ISO screw

1. 2. 3. 4. 5. 6. 7. 8. 9. 10.

See. 1-1 (3. 4.) See. 1-2 (5. 6. 7. 8.)

Type of screw (1.)

S	Normal screw
N	Assembly screw
L	"
D	"
G	"
M	W. Wood screw
F	Feather screw
T	Set screw
Y	"
B	Bolt
N	Nut
W	Washer
R	E-ring
E	—
P	Spring

Shape of head (2.)

P		Pan head
S		Flat countersunk head
H		Oval countersunk head
D		Binding head
R		Round head
B		Round head
T		Truss head
W		Washer head

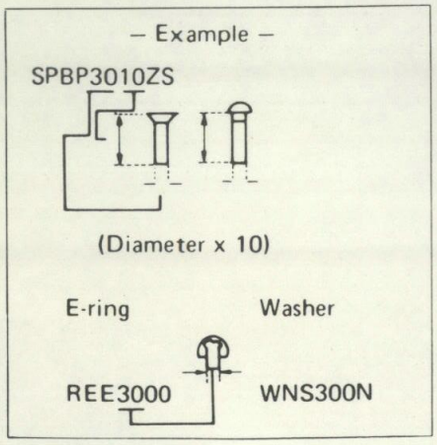
Material (9.)

Symbol letter	Material
S	Steel
E	Stainless steel
C	Cast iron
U	Bronze
B	Brass
P	Phosphor bronze
N	German silver
Y	Brass
A	Aluminum
Z	Zinc-alloy
K	Polycarbonate

1-1 Type of screw

P	Cross-Recessed head screw
A	Tapping screw
B	Tapping screw
T	Tapping screw

1-2 Diameter and Length of screw



Surface treatment (8.)

Symbol letter	Surface treatment
Z	Galvanization, dichromic acid treatment (MFZn2-C)
N	Nickel plating (MFNi2, MFNi1)
R	Chrome plating (MBCr2, MBCr1)
G	Silver plating (SP4)
W	Nichrome platings
P	Phosphite treatment
B	Bronze plating
M	Black coloring after galvanization
A	Red coloring after galvanization
C	Blue coloring after galvanization
T	Green coloring after galvanization
V	Violet coloring after galvanization
F	Iron with black coloring

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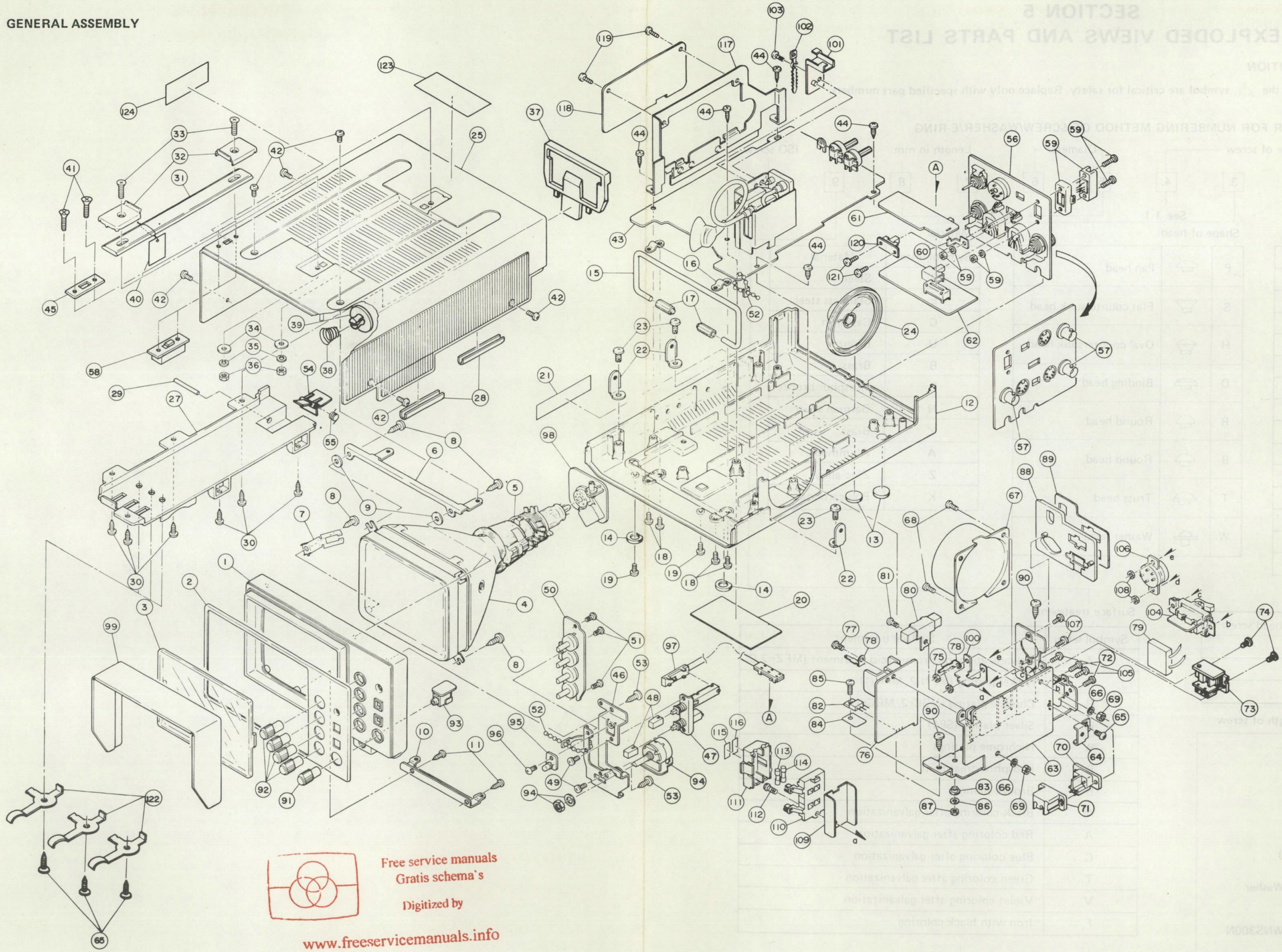
5.3 GENERAL ASSEMBLY



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5.3 GENERAL ASSEMBLY PARTS LIST

SAFETY PRECAUTION
Parts identified by the ⚠ symbol are critical for safety.
Replace only with specified part numbers.

Symbol No.	Part No.	Part Name	Description	Q'ty
1	A10402-003	Front Panel		1
2	A20946-3	Plate		1
3	A20960-001	Protector Glass		1
⚠ 4	150AYB22	CRT		1
⚠ 5	C29125-A	Deflecting Yoke		1
6	CM30249-001	Top Bracket		1
7	A60146-001	Earth Spring		1
8	GBSA4016Z	Screw		4
9	Q03091-110	Washer		2
10	A60139-001	Front Bracket		1
11	SDSA3012Z	Tap. Screw		2
12	A10404-001	Bottom Cover		1
13	A60153-001	Foot		2
14	A60153-002	"		2
15	A60143-001	Stand		1
16	A60144-001	Stand Holder		2
17	A60145-001	Foot		2
18	SSSP3008RS	Screw		4
19	SDSA3010R	"		3
20	A32220-004	Label (EG)	(Rating)	1
	" -005	" (EK)	(")	1
21	A31694-167	"	(Caution)	1
22	A60140-001	Side Bracket		3
23	SDSA4012Z	Tap. Screw		3
24	EAS-8P16SH	Speaker	16 Ω	1
⚠ 25	CM10050-00A-V0	Top Cover		1
26	—	—		—
27	CM20123-001	Battery Holder		1
28	A41545-095	Stick sheet		2
29	PRE3035	Spring Pin		1
30	SDSA3012Z	Tap. Screw		6
31	PU46361-2	Handle		1
32	PU46385-3	Handle Cover		2
33	SHSP4016RS	Screw		2
34	Q03091-110	Washer		2
35	WLS4000Z	Lock Washer		2
36	NNZ4000ZS	Nut		2
37	CM30228-001	Battery Cover		1
38	PU49206	Corn Spring		1
39	PU49958-1-2	Cap		1
40	A31694-180	Label		1
41	SDST3012RS	Tap. Screw		2
42	SDSP3008RS	Screw		6
43	—	Main P.W.B. Ass'y	See Sec. 7.1	1
44	SDSA3012Z	Tap. Screw		5
45	CM40514-001	Top Plate		1
46	A60138-001	VR Bracket		1
47	QSHIP04-001	Push Switch		1
48	A60149-001	Select Knob		2
49	LPSP3006ZS	Screw		2
50	—	Volume P.W.B. Ass'y	See Sec. 7.7	1
51	SBSB3008Z	Tap. Screw		3
52	QHX1108-001	Wire Clamp		2
53	SDSA4012Z	Tap. Screw		2
54	CM40513-001	Eject Knob		1
55	CM40515-001	Spring		1
56	A32216A	Jack Board Ass'y		1
57	PU48567	BNC Connector		3
58	CEX40066-001	Slide Switch	(S506)	1
59	GU20125-42-8	8-Pin Connector		1
60	A60155-001	Plate		1

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Symbol No.	Part No.	Part Name	Description	Q'ty
61	—	Video/Audio Board-2	See Sec. 7.5	1
62	—	Video/Audio Board-1	See Sec. 7.4	1
63	A32152-3	Heat Sink		1
64	A60141-001	Bracket		1
65	SDSA3008Z	Tap. Screw		4
66	WNS4000Z	Washer		2
⚠ 67	A03210-D	Power Trans. Ass'y	(T501)	1
68	LPSP4010ZS	Screw		2
69	NFZ4000ZS	Nut		2
⚠ 70	QMC0263-001	AC Socket Ass'y		1
71	V44399-00D	Cap Ass'y		1
72	SPSP2610Z	Screw		2
73	—	EXT DC P.W.B. Ass'y	See Sec. 7.12	1
74	SDSP3008RS	Screw		2
75	NNZ3000ZS	Nut		2
76	—	Power P.W.B. Ass'y	See Sec. 7.3	1
77	SBSB3008Z	Tap. Screw		1
78	A74122	Lug		2
⚠ 79	QFZ9009-473	MPP Cap	0.047 μF AC 250 V (C508)	1
⚠ 80	QRF107K-150	Unflammable Resistor	15 Ω 10 W, K (R501)	1
81	SBSB3006Z	Tap. Screw		1
⚠ 82	2SB857C	Transistor	(X501)	1
83	BUSH-M-UL	Washer		1
84	1S313	Spacer		1
85	LPSP3010ZS	Screw		1
86	WNS3000Z	Washer		1
87	NFZ3000ZS	Nut		1
88	CM30229-001	Power Holder		1
89	A32155-3	Power Plate		1
90	SDSA4012Z	Tap. Screw		2
91	AXKMA12-2015CX	Knob		1
92	AXKMA12-2015DX	"		4
93	—	Jack P.W.B. Ass'y	See Sec. 7.11	1
94	QVB9D7A-054	OFF-Volume		1
95	—	LED P.W.B. Ass'y		1
96	SBSB3008Z	Tap. Screw		1
97	QSH2002-347B	Wire	(S102)	1
98	—	CRT Socket P.W.B. Ass'y	See Sec. 7.8	1
99	CM20125-00A	Hood		1
100	A60281-001	Insulator		1
101	A32211-001	Holder		1
102	A45979-001	Wire Clamp		1
103	SBSB3006Z	Tap. Screw		1
104	QSE2135-002	Main Switch		1
105	SPSP3006ZS	Screw		2
⚠ 106	QSR0074-010	Voltage Selector	(S505)	1
107	SPSP3010ZS	Screw		2
108	NNZ3000ZS	Nut		2
109	A60291-1	Fuse Bracket		1
⚠ 110	A38548-AV0	Fuse Holder		1
111	A38549-IV0	Fuse Cover		1
112	SBSB3008Z	Tap. Screw		1
⚠ 113	QMF51A2-R63	Fuse	T630 mA (F1)	1
⚠ 114	QMF51A2-R315	"	T315 mA (F3)	1
115	C40078-60	Label		1
116	C40078-59	"		1
117	A32217-1	Bracket		1
118	—	P/S PB P.W.B. Ass'y	See Sec. 7.2	1
119	SBSB3008Z	Tap. Screw		2
120	—	Color System P.W.B. Ass'y	See Sec. 7.9	1
121	SDSA3012Z	Screw		2
122	CM40512-00A	Battery Terminal		3
123	CM30360-001	Label	(Caution)	1
124	" -002	"	(")	1

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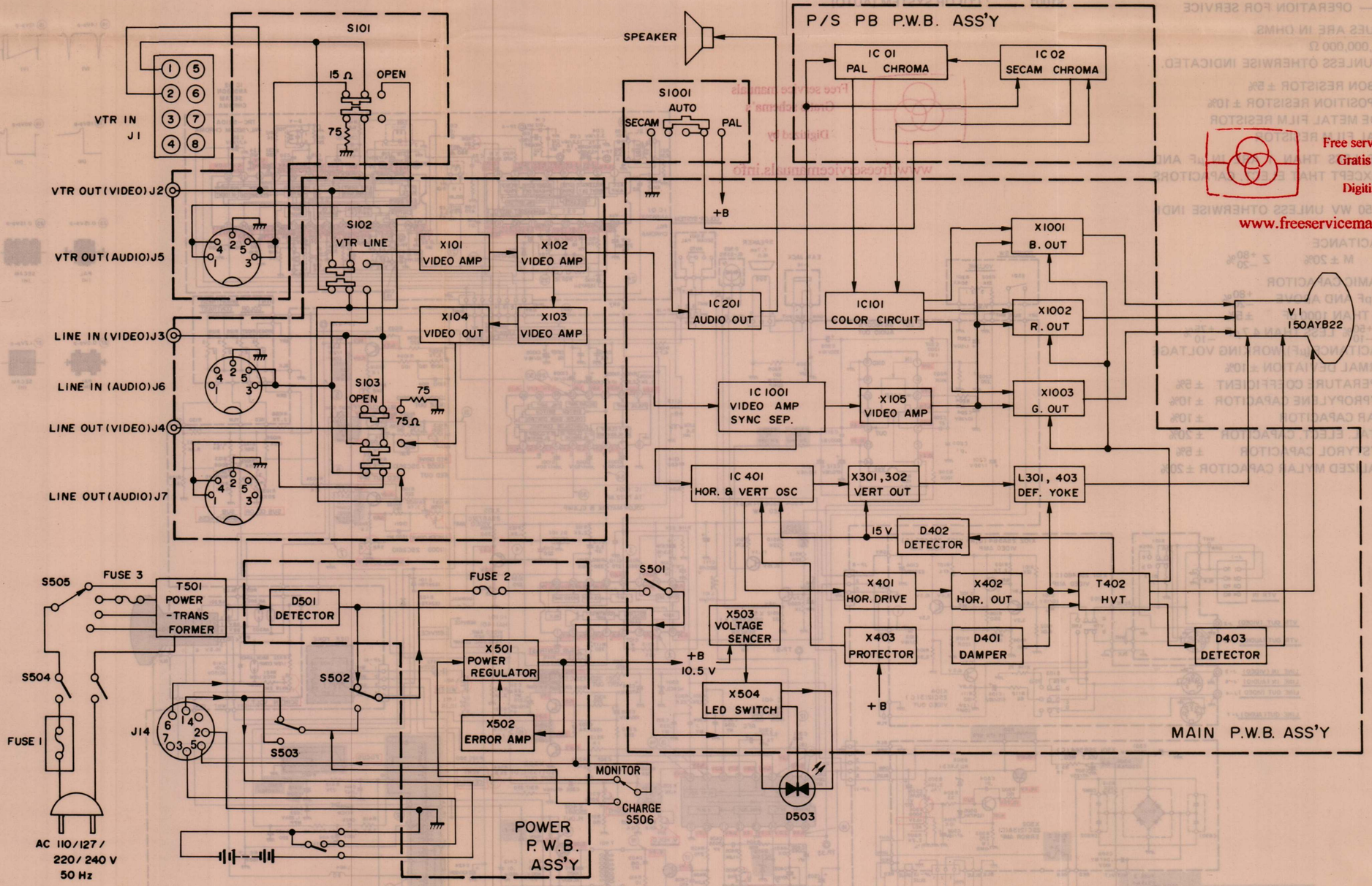
SECTION 6
DIAGRAMS AND CIRCUIT BOARDS

6.1 BLOCK DIAGRAM



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NOTE:

1) ALL VOLTAGES SHOW READINGS BY CIRCUIT TESTER (20 KΩ/V) ON RECEPTION OF 1 Vp-p COLOR BAR VIDEO SIGNAL.
   VOLTAGES IN PARENTHESES REFER TO SECAM MODE. WHEN ONLY ONE VALUE APPEARS, IT REFERS TO BOTH PAL AND SECAM MODES.

2) ALIGNMENT ═══ OPERATION FOR USER
   ——— OPERATION FOR SERVICE

3) ALL RESISTANCE VALUES ARE IN OHMS.
   K : 1,000 Ω M : 1,000,000 Ω
   RESISTORS ARE 1/4 W UNLESS OTHERWISE INDICATED.

UNSPECIFIED	: CARBON RESISTOR ± 5%
COMP.	: COMPOSITION RESISTOR ± 10%
OMR	: OXIDE METAL FILM RESISTOR
MFR	: METAL FILM RESISTOR

4) CAPACITANCE VALUES LESS THAN 1 ARE IN μF AND 1 AND ABOVE IN pF EXCEPT THAT ELECT. CAPACITORS ARE IN μF.
   RATING VOLTAGE IS 50 WV UNLESS OTHERWISE INDICATED.
   TOLERANCE FOR CAPACITANCE
   J ± 5% K ± 10% M ± 20% Z $^{+80}_{-20}$%

UNSPECIFIED	: CERAMIC CAPACITOR
	1000 pF AND ABOVE $^{+80}_{-20}$%
	LESS THAN 1000 pF ± 5%
ELECT. CAPACITOR:	$^{+50}_{-10}$% LESS THAN 4.7 μF $^{+75}_{-10}$%
	CAPACITANCE (μF)/WORKING VOLTAGE
B	: THERMAL DEVIATION ± 10%
CH, RH	: TEMPERATURE COEFFICIENT ± 5%
PP	: POLYPROPYLENE CAPACITOR ± 10%
MY	: MYLAR CAPACITOR ± 10%
TA	: TANTAL. ELECT. CAPACITOR ± 20%
PS	: POLYSTYROL CAPACITOR ± 5%
MPP	: METALIZED MYLAR CAPACITOR ± 20%

5) SELECTOR SW (POSITION)

S101(a, b)	: TERMINAL IMP. SELECTOR FOR VTR INPUT (75 Ω)
S102(a, b)	: INPUT SELECTOR (VTR)
S103(a, b, c)	: LINE OUT SELECTOR (BRIDGE OUT)
S501	: POWER SW (OFF)
S504	: MAINS POWER (OFF)
S505	: VOLTAGE SELECTOR (240 V)
S1001	: COLOR SYSTEM (AUTO)

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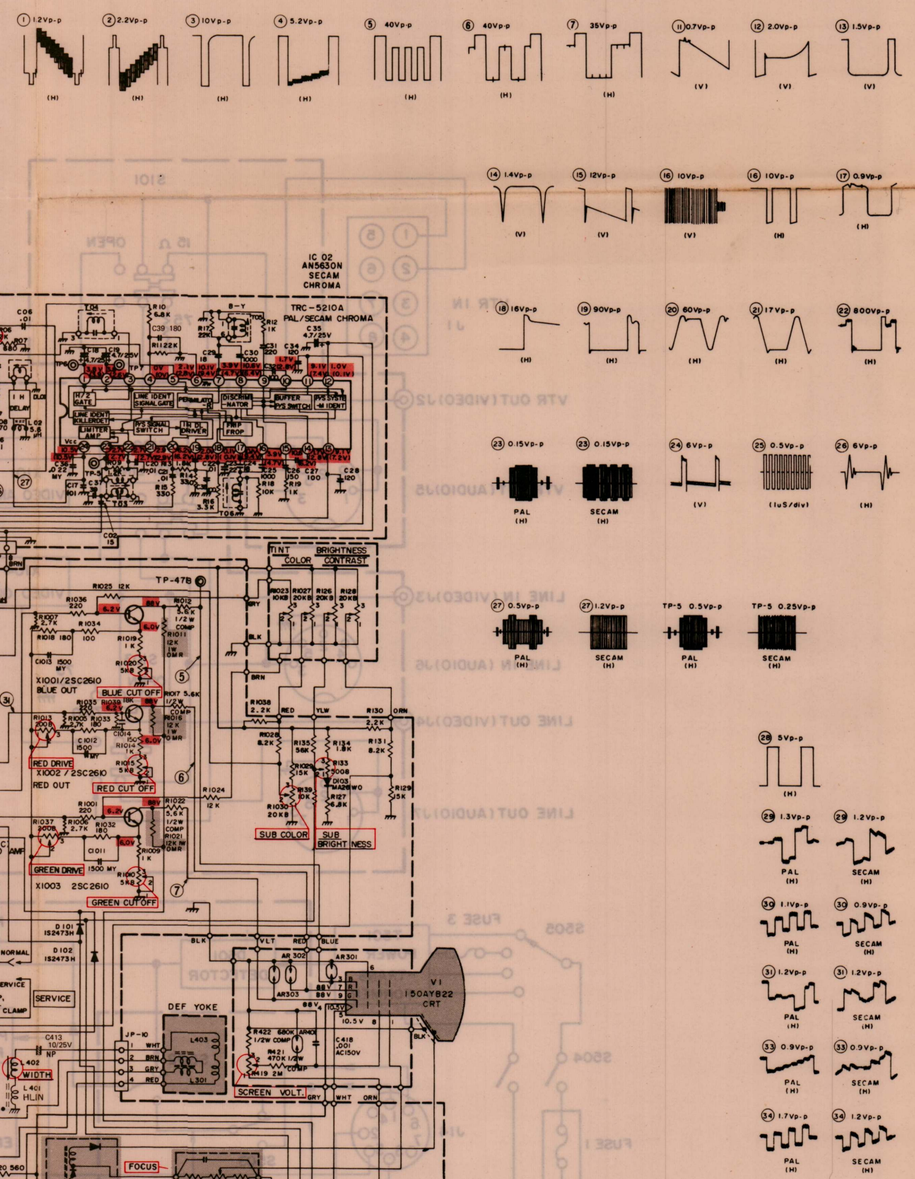

SAFETY PRECAUTION

Shaded (▬) parts are critical for safety. Replace only with specified part numbers.

6-2

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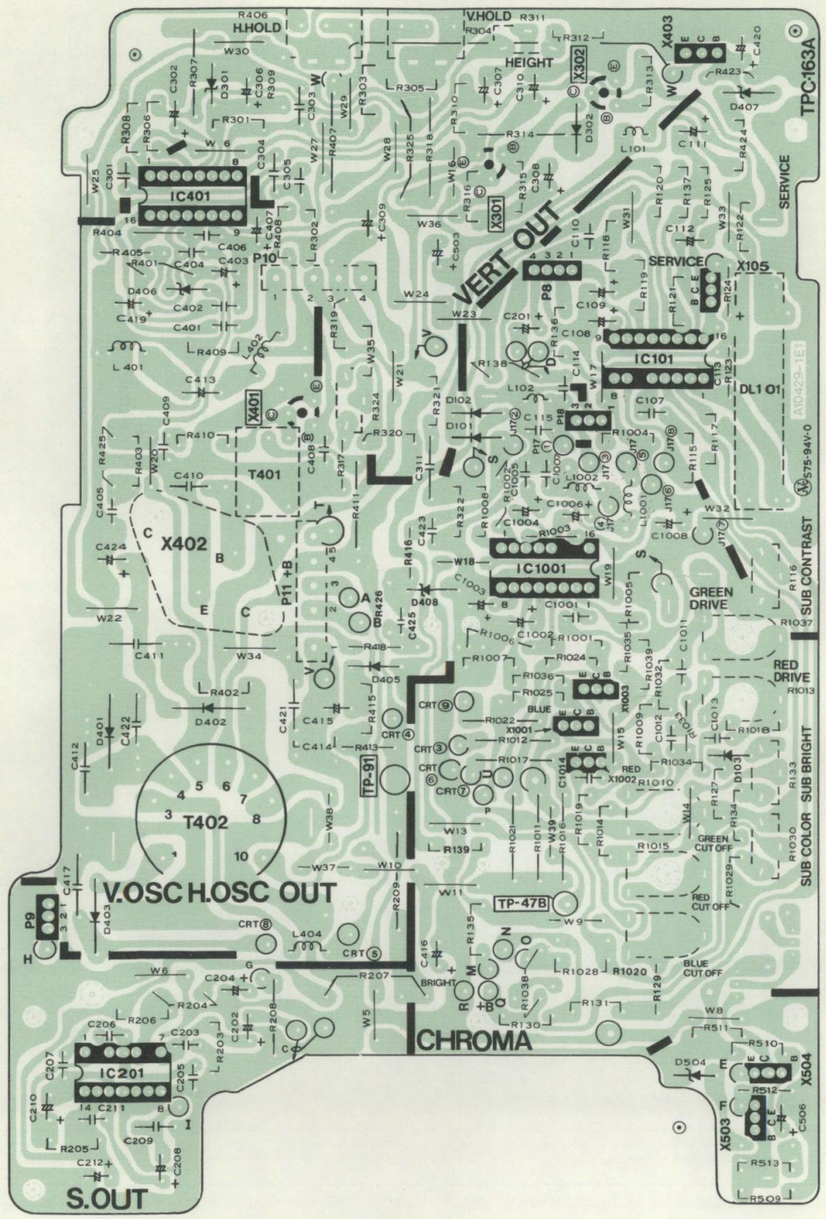
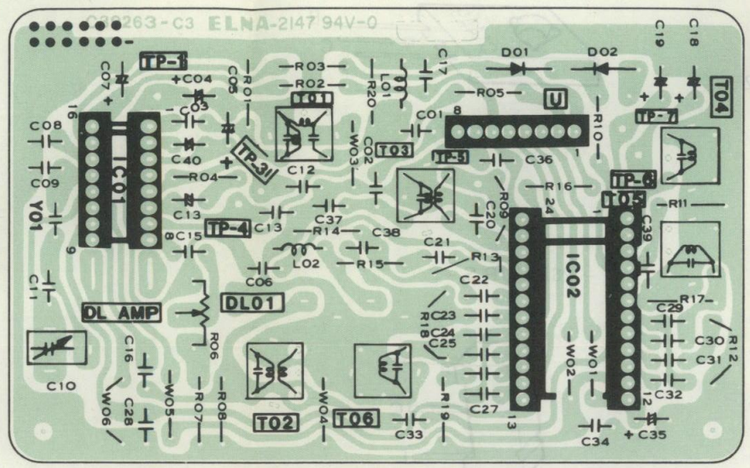
6.3 CIRCUIT BOARDS

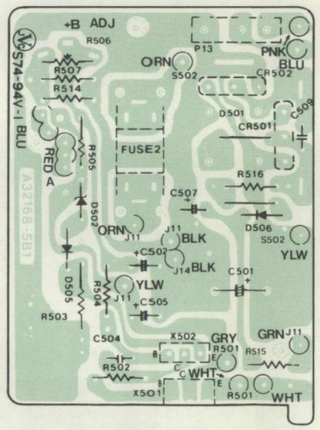
– MAIN BOARD –



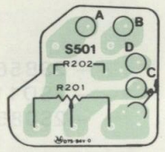
– PAL/SECAM PB BOARD –



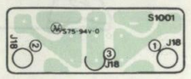
– POWER BOARD –



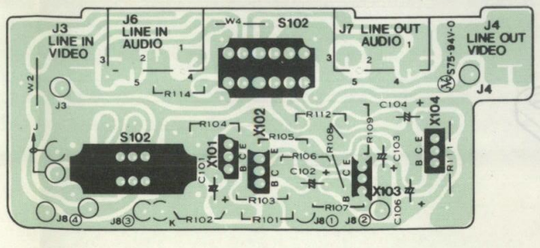
– POWER SWITCH BOARD –



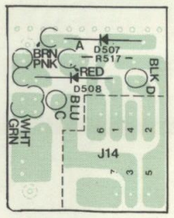
– COLOR SYSTEM BOARD –



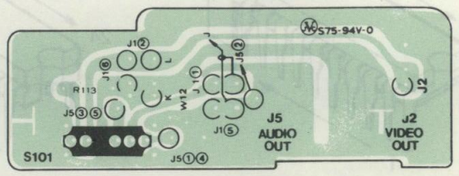
– VIDEO/AUDIO BOARD-1 –



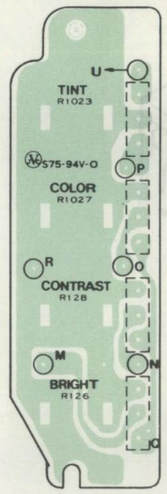
– EXT DC BOARD –



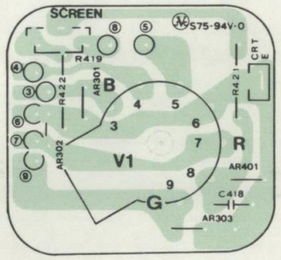
– VIDEO/AUDIO BOARD-2 –



– VOLUME BOARD –

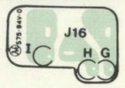


– CRT SOCKET BOARD –



– LED BOARD –

– JACK BOARD –



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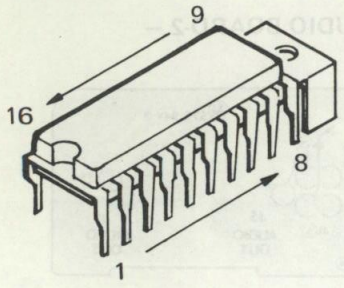
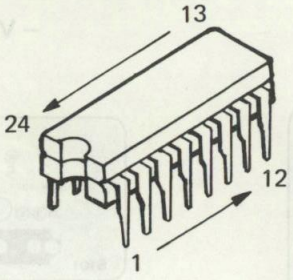
IC & Transistor Basing

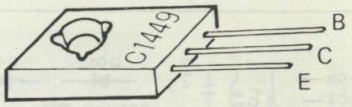
– AN5620X –



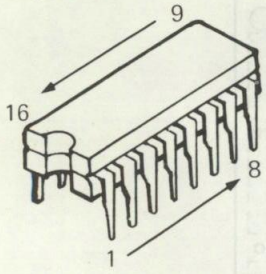
– AN5630N –



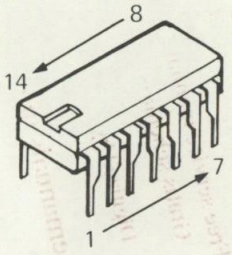
– 2SC1449K –



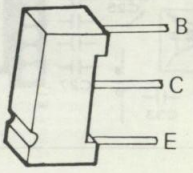
– HA11401 –
– HA11244 –
– TA7622AP –



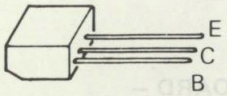
– SN76007N –



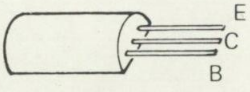
– 2SD637R,S –



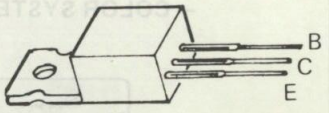
– 2SC460C –
– 2SA673C –
– 2SC1213A, C –



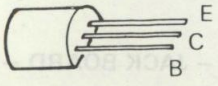
– 2SC2610 –



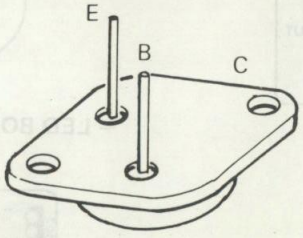
– 2SB566C –
– 2SD1133C, D –
– 2SB857C –



– 2SA564Q,R –
– 2SC1685R –



– 2SC681 –



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SECTION 7
ELECTRICAL PARTS LIST

1. SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety.
Replace only with specified part numbers.

2. Abbreviations in this list are as follows:

RESISTORS – All resistance values are in ohms (Ω).

K	:	1 000
M	:	1 000 000
CR	:	Carbon Resistor
Comp. R	:	Composition Resistor
WR	:	Wire Wound Resistor
OMR	:	Oxide Metal Film Resistor
VR	:	Variable Resistor (Potentiometer)
MFR	:	Metal Film Resistor
FR	:	Fusible Resistor

CAPACITORS – All capacitance values are in μF, unless otherwise indicated.

P	:	μμF
C Cap	:	Ceramic Capacitor
E Cap	:	Electrolytic Capacitor
FM Cap	:	Film Mica Capacitor
MM Cap	:	Metalized Mylar Capacitor
MP Cap	:	Metalized Paper Capacitor
MY Cap	:	Mylar Capacitor
NP Cap	:	Non-polar Capacitor
PC Cap	:	Polycarbonate Capacitor
PP Cap	:	Poly Pro Capacitor
PS Cap	:	Polystyrol Capacitor
T Cap	:	Tantalum Capacitor
TR Cap	:	Trimmer Capacitor

Tolerances of resistors or capacitors are as follows:

M	:	± 20 %
K	:	± 10 %
J	:	± 5 %
G	:	± 2 %
F	:	± 1 %

7.1 MAIN P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
IC101	HA11401	Integrated Circuit	
IC201	SN76007N	"	
⚠ IC401	HA11244	"	
IC1001	TA7622AP	"	
X105	2SA673C	Transistor	
X301	2SD1133C, D	"	
X302	"	"	
⚠ X401	2SC1449K	"	
⚠ X402	2SC681	"	
⚠ X403	2SC1685R	"	
X503	2SD673R, S	"	
X504	"	"	
X1001	2SC2610	"	
X1002	"	"	
X1003	"	"	
D101	1S2473H	Diode	
D102	"	"	
D103	MA26W0-B	"	
D301	HZ9C1LF7	Zener Diode	
D302	1S2076A	Diode	
⚠ D401	V19E	"	
⚠ D402	V09E	"	
⚠ D403	Y11CA	"	
D404	–	–	
⚠ D405	1S2076A	Diode	
⚠ D406	HZ7C1LF7	Zener Diode	
⚠ D407	RD12EB3	"	
D408	HZ9C1LF7	"	
D501	1S2473H	Diode	
⚠ D504	HZ9C1L01F7	Zener Diode	
R115	QRD141J-103S	CR	
R116	QVP2A0B-023	VR (SUB CONTR)	2 K
R117	QRD141J-331S	CR	
R118	" -823S	"	
R119	" -561S	"	
R120	" -331S	"	
R121	" -103S	"	
R122	" -222S	"	
R123	" -182S	"	
R124	" -391S	"	
R125	QRD142J-150S	"	
R126	–	–	
R127	QRD141J-682S	CR	
R128	–	–	
R129	QRD141J-153S	CR	
R130	" -222S	"	
R131	" -822S	"	
R132	–	–	
R133	QVP2A0B-052	VR (SUB BRIGHT)	500
R134	QRD141J-182S	CR	
R135	" -563S	"	
R136	" -680S	"	
R137	" -221S	"	
R138	" -682S	"	
R139	" -103S	"	

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Symbol No.	Part No.	Part Name	Description
R203	QRD141J-104S	CR	
R204	" -181S	"	
R205	" -151S	"	
R206	" -104S	"	
⚠ R207	QRG029J-100	OMR	
R208	QRC122K-101	Comp. R	
⚠ R209	QRG029J-100	OMR	
R301	QRD141J-822S	CR	
R302	" -223S	"	
R303	" -472S	"	
R304	QVF4A6B-014	VR (V. HOLD)	10 K
R305	QRD141J-123S	CR	
R306	" -223S	"	
⚠ R307	QRX019J-3R3	MFR	
R308	QRD141J-273S	CR	
R309	" -471S	"	
R310	" -223S	"	
R311	QVP2A0B-022	VR (HEIGHT)	200
R312	QRD141J-151S	CR	
R313	" -102S	"	
⚠ R314	QRX019J-3R9	MFR	
R315	QRD141J-271S	CR	
R316	" -271S	"	
R317	" -331S	"	
⚠ R318	QRG029J-101	OMR	
R319	QRD141J-102S	CR	
R320	" -561S	"	
R321	" -392S	"	
R322	" -332S	"	
R323	–	–	
R324	QVP2A0B-023	VR (V. CENTER)	2 K
⚠ R325	QRG029J-101	OMR	
R401	QRD141J-103S	CR	
R402	" -123S	"	
R403	" -560S	"	
R404	" -683S	"	
R405	QRV141F-1182	CMF R	
R406	QVF4A6B-053	VR (H. HOLD)	5 K
⚠ R407	QRG029J-221	OMR	
R408	QRD141J-471S	CR	
R409	" -821S	"	
R410	" -101S	"	
⚠ R411	QRG029J-330	OMR	
R412	–	–	
R413	QRD141J-153S	CR	
R414	–	–	
R415	QRD141J-273S	CR	
R416	" -102S	"	
R417	–	–	
R418	QRD141J-562S	CR	
R419	–	–	
⚠ R420	C30336-B	VR (FOCUS)	
R421	–	–	
R422	–	–	
R423	QRD141J-472S	CR	
R424	" -102S	"	
R425	" -560S	"	
R509	QRD141J-102S	CR	

Symbol No.	Part No.	Part Name	Description
R510	QRD141J-223S	CR	
R511	" -472S	"	
R512	" -220S	"	
R513	" -331S	"	
R1001	QRD141J-221S	CR	
R1002	" -222S	"	
R1003	" -103S	"	
R1004	" -472S	"	
R1005	" -272S	"	
R1006	" -272S	"	
R1007	" -272S	"	
R1008	" -222S	"	
R1009	" -102S	"	
R1010	QVP5A6B-053	VR (G. CUT OFF)	5 K
⚠ R1011	QRG019J-123	OMR	
R1012	QRC122K-562	Comp. R	
R1013	QVP5A6B-022	VR (R. DRIVE)	200
R1014	QRD141J-102S	CR	
R1015	QVP5A6B-053	VR (R. CUT OFF)	5 K
⚠ R1016	QRG019J-123	OMR	
R1017	QRC122K-562	Comp. R	
R1018	QRD141J-181S	CR	
R1019	" -102S	"	
R1020	QVP5A6B-053	VR (B. CUT OFF)	5 K
⚠ R1021	QRG019J-123	OMR	
R1022	QRC122K-562	Comp. R	
R1023	–	–	
R1024	QRD141J-123S	CR	
R1025	" -123S	"	
R1026	–	–	
R1027	–	–	
R1028	QRD141J-822S	CR	
R1029	" -153S	"	
R1030	QVP2A0B-024	VR (SUB COLOR)	20 K
R1031	–	–	
R1032	QRD141J-181S	CR	
R1033	" -181S	"	
R1034	" -101S	"	
R1035	" -221S	"	
R1036	" -221S	"	
R1037	QVP5A6B-022	VR (G. DRIVE)	200
R1038	QRD141J-222S	CR	
R1039	" -183S	"	
C107	QCS31HJ-4R0	C Cap	
C108	QEE51VM-474	T Cap	
C109	QET61CR-335	E Cap	
C110	QCS31HJ-271	C Cap	
C111	QET61CR-227	E Cap	
C112	QEN51HM-335	"	
C113	QCS31HJ-221	C Cap	
C114	" -681	"	
C115	" -391	"	
C201	QET61HR-105	E Cap	
C202	" -105	"	
C203	QCS31HJ-221	C Cap	
C204	QET61CR-106	E Cap	
C205	QCF31HP-103	C Cap	
C206	QCF31HJ-270	"	
C207	QCY31HK-152	"	

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Symbol No.	Part No.	Part Name	Description
C208	QET61CR-227	E Cap	
C209	QFM71HK-104	MY Cap	
C210	QET61CR-107	E Cap	
C211	QCY31HK-102	C Cap	
C212	QET61CR-477	E Cap	
C301	QCY31HK-681	C Cap	
C302	QEE51CK-225	T Cap	
C303	QFM71HK-563	MY Cap	
C304	" -104	"	
C305	" -393	"	
C306	QET61CR-477	E Cap	
C307	QEE51CK-106	T Cap	
C308	QET61CR-107	E Cap	
C309	" -477	"	
C310	QET61ER-477	"	
C311	QFM71HK-224	MY Cap	
C401	QFM71HK-102	MY Cap	
C402	" -822	"	
C403	QET61HR-474	E Cap	
C404	QFM71HK-223	MY Cap	
C405	" -333	"	
C406	QFP31HJ-562	PP Cap	
C407	QET61CR-107	E Cap	
C408	QCY32HK-471	C Cap	
C409	QFM71HK-183	MY Cap	
C410	QCZ9017-102	C Cap	
C411	AX49316-153	PP Cap	
C412	" -822	"	
C413	AX49290	BP Cap	
C414	QFM71HK-473	MY Cap	
C415	QEN51HA-105	E Cap	
C416	QEW62CA-475	"	
C417	QFH63BK-223	PP Cap	
C418	–	–	
C419	QET61HR-474	E Cap	
C420	QET61AR-107	"	
C421	AX49316-153	PP Cap	
C422	–	–	
C423	QCS31HJ-221	C Cap	
C424	QET61ER-107	E Cap	
C425	QFM72AK-103	MY Cap	
C503	QET61CR-108	E Cap	
C506	QET51CR-107	"	
C1001	QET61HR-105	E Cap	
C1002	" -105	"	
C1003	" -105	"	
C1004	" -106	"	
C1005	QCS31HJ-680	C Cap	
C1006	QET61CR-106	E Cap	
C1007	QCS31HJ-680	C Cap	
C1008	QET61CR-106	E Cap	
C1009	–	–	
C1010	–	–	
C1011	QFM71HK-152	MY Cap	
C1012	" -152	"	
C1013	" -152	"	
C1014	QCS31HJ-151	C Cap	
DL101	A76140	Delay Line	

Symbol No.	Part No.	Part Name	Description
L101	A49468-101	Peaking Coil	
L102	" -562	"	
L401	A76611	Linearity Coil	
L402	A75759	Width Coil	
L403	–	–	
L404	C30443-A	Heater Choke	
L1001	A04725-220	Peaking Coil	
L1002	" -220	"	
T401	A75757	HOR. Drive Transf.	
⚠ T402	C29120-A	HV Transf.	
	A32169-2	Shield Cover	
	SBSB3008Z	Screw	
	A46445	Focus Cover	
⚠	QWD059-18A5A5	High Volt Wire	

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7.2 PAL/SECAM PB P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
IC01	AN5620X	Integrated Circuit	for PAL
IC02	AN5630N	"	for SECAM
D01	1S2473H	Diode	
D02	"	"	
R01	QRD142J-332S	CR	
R02	QRZ0054-100	FR	
R03	QRD142J-103S	CR	
R04	" -223S	"	
R05	" -471S	"	
R06	QVZ3230-023	VR	2 kΩ
R07	QRD142J-681S	CR	
R08	" -471S	"	
R09	" -122S	"	
R10	" -682S	"	
R11	" -223S	"	
R12	" -102S	"	
R13	" -182S	"	
R14	" -331S	"	
R15	" -331S	"	
R16	" -332S	"	
R17	" -223S	"	
R18	" -183S	"	
R19	" -102S	"	
R20	" -101S	"	
R21	" -222S	"	
C01	QCS31HJ-820	C Cap	
C02	" -150	"	
C03	QCF31EZ-103	"	
C04	QEE51CM-335	T Cap	
C05	" -225	"	
C06	QCF31EZ-103	C Cap	
C07	QEE51CM-336	T Cap	
C08	QCS31HJ-180	C Cap	
C09	" -680	"	
C10	QAT3001-010	TR Cap	30 pF
C11	QCS31HJ-100	C Cap	
C12	QFM71HK-123	MY Cap	
C13	QEN51HM-105	E Cap	
C14	QFM71HK-123	MY Cap	
C15	QCS31HJ-181	C Cap	
C16	QCF31EZ-103	"	
C17	" -103	"	
C18	QEW51EA-475	E Cap	
C19	" -475	"	
C20	QCF31EZ-103	C Cap	
C21	" -103	"	
C22	" -103	"	
C23	QCS31HJ-220	"	
C24	QCT25CH-180	"	
C25	QCF31EZ-102	"	
C26	QCS31HZ-151	"	
C27	" -101	"	
C28	" -121	"	
C29	QCT25CH-180	"	
C30	QCF31EZ-102	"	
C31	QCS31HJ-221	"	
C32	" -101	"	
C33	QCF31EZ-103	"	
C34	QCS31HJ-121	C Cap	
C35	QEW51EA-475	E Cap	
C36	QFM71HK-223	MY Cap	
C37	QCT25CH-390	C Cap	
C38	QCS31HJ-101	"	
C39	" -181	"	
C40	QEN51EM-335	E Cap	
L02	A04725-5R6	Peaking Coil	
DL01	A75103-B	1H Delay Line	
T01	A60297-A	BP Transf.	
T02	A75097	DL P Transf.	
T03	A75140	Bell Transf.	
T04	A76146	Ident. Transf.	
T05	A75142	Discri. Transf.	
T06	A75142	"	
Y01	A76090	Crystal	

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7.3 POWER P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
X502	2SC1213A(C)	Transistor	
D501	S4VB20(V)	Si. Diode Stack	
D502	RD5.6EB1	Zener Diode	
D505	1S2473H	Diode	
D506	1S2076A	"	
R502	QRD142J-151S	CR	
R503	QRG019J-271	OMR	
R504	QRD142J-330S	CR	
R505	QRV141F-2151	CMF Resistor	
R506	QVP2A0B-052	VR	
R507	QRV141F-2201	CMF Resistor	
R514	QRD142J-103S	CR	
R515	" -102S	"	
R156	QRC122K-151	Comp. R	
C501	QEV71ER-688	E Cap	
C502	QET51CR-476	"	
C503	—	—	
C504	QCF31HP-103	C Cap	
C505	QET51CR-477	E Cap	
C506	—	—	
C507	QET51CR-476	E Cap	
C508	—	—	
C509	QFM72AK-473	MY Cap	
CR501	A03008-006	CR Block	
CR502	A03008-006	"	
⚠F 2	QMF51A2-2R0	Fuse	T2A
	A44594-001	Fuse Clip	
J11	CH40277-00A	Connector Ass'y	5-P
P13	A75802-3	Connector Base	3-P
	A60152-00A	Heat Sink	for D501
	SBSB3012Z	Tap. Screw	

7.4 VIDEO/AUDIO BOARD-1

Symbol No.	Part No.	Part Name	Description
X101	2SC460C	Transistor	
X102	2SA564Q,R	"	
X103	2SC460C	"	
X104	2SC1213C	"	
R101	QRD141J-123S	CR	
R102	" -682S	"	
R103	" -272S	"	
R104	" -681S	"	
R105	" -121S	"	
R106	" -561S	"	
R107	" -473S	"	
R108	" -124S	"	
R109	" -682S	"	
R110	—	—	
R111	QRC122K-181	Comp. R	
R112	QRD141J-680S	CR	
R113	QRD141J-750S	"	
R114	" -750S	"	
C101	QET61CR-106	E Cap	
C102	" -106	"	
C103	" -106	"	
C104	" -477	"	
C105	—	—	
C106	QET61CR-227	E Cap	
S102	QSS2201-501	Slide Switch	
S103	QSS4201-072	"	

7.5 VIDEO/AUDIO BOARD-2

Symbol No.	Part No.	Part Name	Description
R113	QRD141J-750S	CR	
S101	QSS2201-202	Slide Switch	

7.6 POWER SWITCH P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
R201	QVB9D7A-054	VR (SW/VOL)	50 K
R202	QRD141J-333S	CR	

7.7 VOLUME P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
R126	QVG6A7B-124	VR(BRIGHT)	20 K
R127	—	—	
R128	QVG6A7B-124	VR(CONTR)	20 K
R1023	QVG6A7B-114	VR(TINT)	10 K
R1027	QVG6A7B-124	VR(COLOR)	20 K

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7.8 CRT SOCKET P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
R419	QVZ3218-026G	VR (SCREEN VOLT) 2 M	
R421	QRC122K-474	Comp. R	
R422	" -684	"	
C418	QCZ9001-102	C Cap	
AR301	A76403	Air Gap	
AR302	"	"	
AR303	"	"	
AR401	"	"	
⚠	A76121	CRT Socket	

7.9 COLOR SYSTEM P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
S1001	AX49558	Slide Switch	

7.10 L.E.D. P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
D503	GL-53RG	LED	

7.11 JACK P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
J16	QMS3501-014	Jack	(Earphone)

7.12 EXT DC P.W.B. ASS'Y

Symbol No.	Part No.	Part Name	Description
D507	U05B	Si. Diode	
D508	U05B	"	
R517	QRD142J-102S	CR	
J14	PU50454	Din Socket	(7 Pin)

E. & O.E. No. 8213

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